Arizona Public Service

Comprehensive

Fire Mitigation Plan

2024

Version January 1.0

2024 APS Comprehensive Fire Mitigation Plan

Contents

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1. Introduction

Arizona continues to experience larger and more frequent wildfires throughout the landscape. APS is working to address the challenge of safely and reliably serving customers while mitigating wildfire potential. From 2000 to 2020, Arizona experienced over 600 large fires (fires greater than 100 acres in size) within the APS service territory. We are witnessing increasing trends in size and frequency of wildfires. This increase in activity means we must remain adaptable and evolve, ensuring our mitigation measures are commensurate with the risk. We have implemented a comprehensive, multi-faceted approach utilizing strategies and programs centered around prevention, mitigation and response to wildfires. This Comprehensive Fire Mitigation Plan (CFMP) outlines the approach and actions taken by APS. The initiatives and strategies described in this document are continued from previous foundational years of fire mitigation at APS.

1.1. The APS Promise

The APS Promise is our commitment to customers, the community and each other. Our promise is why we are here (our purpose), what we are here to do (vision and mission) and the principles and behaviors that will empower us to achieve our strategic goals. It represents the opportunity to build on our cultural strengths and develop new behaviors to enable our future success as we serve to deliver clean, reliable and affordable energy.

Our Purpose: As Arizona stewards, we do what is right for the people and prosperity of our state.

Our Vision: Create a sustainable energy future for Arizona.

Our Mission: Serve our customers with clean, reliable and affordable energy.

Our Principles: Design for tomorrow, empower each other and succeed together.

1.2. APS Fire Mitigation Vision and Mission Statement

Vision

APS's Fire Mitigation program is committed to reducing wildfire risk to our human and environmental communities. APS is committed to our customers and stakeholders as we work together to address the challenges of reducing fire fuels and creating defensible space.

Mission

Provide safety, mitigate risk, increase reliability, and promote cohesive fire mitigation strategies across Arizona with all stakeholders.

2. Overview of the Comprehensive Fire Mitigation Plan

The CFMP was created to support and uphold the APS Promise. The risk of wildfire creates diverse and dynamic challenges when it comes to creating and delivering reliable electricity

across the APS service territory. APS is committed to reducing the risk of wildfires and has integrated fire mitigation strategies and efforts throughout the enterprise. This document outlines fire mitigation strategies, procedures and protocols in order to create awareness, understanding and provide guidance to all APS business units on how to prevent, mitigate and respond to wildfire events.

2.1. CFMP Contributors

The APS CFMP details the responsibilities for the individuals who are executing the plan. This includes the executives and program owners specific to each component of the plan. The CFMP is a companywide, interdepartmental effort involving resources and programs across the APS business units.

All APS business units are responsible for wildfire risk and have the primary responsibility of owning and executing the CFMP. Responsible business unit leadership and executives within APS shall track progress metrics and activities to reduce the risk of wildfire exposure and ignition probability.

3. Goals and Objectives of the Plan

Wildfire risk mitigation strategies have continued to evolve. With the increasing impact from a variety of factors such as climate change, development, and population growth in fire-prone areas, catastrophic wildfires continue to pose a threat throughout Arizona and the APS service territory. The CFMP describes the company's wildfire mitigation strategies and programs that have been developed and implemented as APS expresses its commitment for continuous improvement and best management practices.

3.1. CFMP Goals

- Reduce wildfire risk.
- Deliver reliable electricity.
- Create a common operating picture for APS business units.
- Promote a cohesive strategy among stakeholders.

3.2. CFMP Objectives

- Identify the individuals responsible for executing the CFMP.
- Outline fire mitigation policies, procedures and protocols.
- Establish fire mitigation chain of command.
- Identify APS fire mitigation strategies and programs.
- Identify necessary communications and notifications in the event power is to be shut off due to wildfire.
- Identify vegetation management best practices for APS Transmission and Distribution Rights-of-Ways.
- Establish Fire Risk Index and re-evaluate for necessary updates.
- Monitor conditions and assign preparedness levels for each APS district.
- Ensure APS has an adequate workforce to manage restoration efforts after an event.

- Host an annual Fire Mitigation Forum.
- Align CFMP with the APS Emergency Preparedness Plan, as well as all associated APS 3P documentation.

3.3. Collaborative Goals with Stakeholders

Forest Health

- Encourage a resilient and diverse forest ecosystem around APS electrical systems.
- Encourage landscape-scale outcomes to restore healthy ecosystems and enhance sustainability.

Wildfire Risk and Mitigation

- Provide a CFMP to support the safe and reliable delivery of electricity.
- Identify wildland ecosystems where appropriate fire regimes maintain health and resilient natural vegetation.
- Promote Fire Adapted Communities and Defensible Space for healthy landscapes and wildfire prepared communities.
- Integrate the National Cohesive Strategy into the CFMP while educating the customers APS serves.

Economics

- Increase community recognition around the economic importance of protecting healthy, natural systems.

Climate

- Increase resilience of ecosystems to climate disruption.
- Promote Right Tree–Right Place practices.
- Promote and participate in Right-of-Ways Stewardship.

People and Culture

- Share and uphold the APS Promise.
- Improve communication between all land management agencies, indigenous tribes and other cultural groups regarding varying perspectives and beliefs related to fire mitigation.
- Appropriately communicate the Vision and Mission of the APS CFMP.

3.4. Executive Summary

In Arizona, over 48% of structures are in the Wildland Urban Interface (USDA, 2010). Furthermore, 71% of these structures are second homes and not primary residences, which can pose additional challenges in managing fuels and fire mitigation due to absentee ownership. Extended drought over the past decade has caused forest and vegetation ecosystems to be stressed from the lack of regular and sufficient moisture. This is compounded by shorter, drier winters and longer, warmer summers (USDA, 2010).

Reducing risk to our human and environmental communities is paramount. Wildland fuel mitigation needs to be emphasized to all stakeholders as we work together to address the problem. We cannot make significant strides in reducing catastrophic wildland fire risk unless all stakeholders participate in creating defensible space. APS has identified the risk and is working with partners to create a cohesive strategy to mitigate that risk.

The approach to mitigating risk at APS is a combination of elements. First is understanding the risk and developing a model to prioritize resources. Next is educating and informing the communities we serve that mitigation is the key to prevention. Third is implementing a proactive approach, such as the Defensible Space Around Poles (DSAP) program to address vegetation at the base of utility poles. Last, APS utilizes Integrated Vegetation Management (IVM) practices to promote healthy, manageable and sustainable ecosystems within its Right-of-Ways (ROW).

Furthermore, APS also supports fire management operations that include prescribed fire treatments as well as large-scale forest restoration treatments around power line ROW in the effort to protect infrastructure and reintroduce fire into the ecosystem to prevent catastrophic wildfire events.

APS is at the forefront of the discussion among utilities in fire mitigation and has developed a fire-risk model to track risk based on available fuels and fire history. In addition, we have created employee training to prepare for wildland fire safety while working in the field. This includes wildfire preparedness levels which provide situational awareness information to employees, contractors and utility partners.

Within our strategic framework at APS, our mission is to generate and deliver reliable electric power and related services to our customers with a respect for the land founded upon sound principle to support the diverse ecosystems across Arizona safely and efficiently.

4. Wildfire Mitigation Challenges

With continued growth and expansion across the state, wildland-urban interface areas across APS service territory have also expanded, creating greater exposure to APS. With a surging population growing into what was once wildland areas, APS’s footprint also increases — causing the potential for wildland fire impact. Identification and prioritization of high fire risk areas is vital to successful fire mitigation and long-term planning.

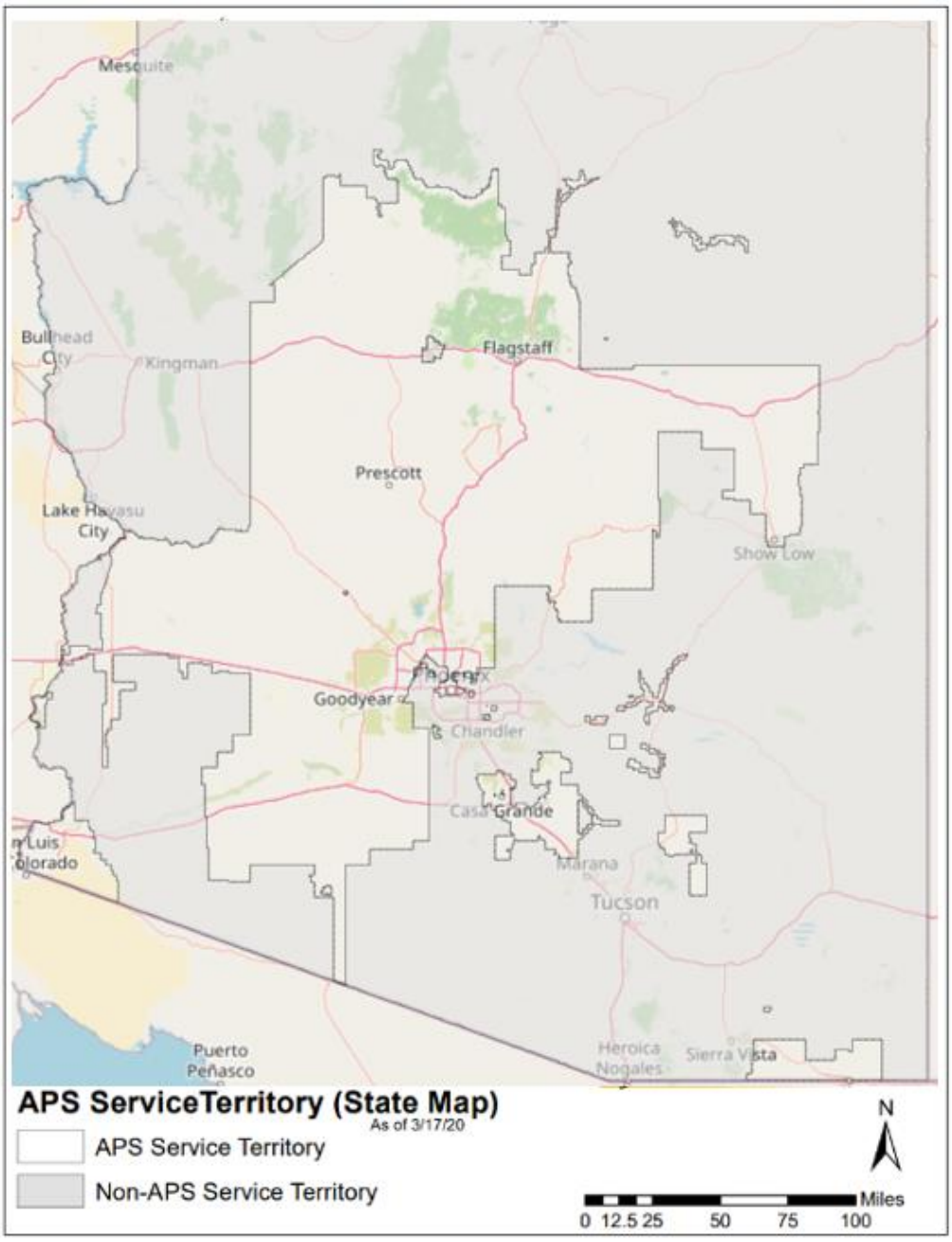


Figure 1. Map depicting the APS Service Territory

4.1. Arizona's Forest Ecosystem and Landscape

Arizona is a state full of diverse landscapes. The diversity of Arizona's forests ranges from riparian gallery forests traversing the low desert to sub-alpine and montane forests above 9,000 feet in elevation (O'Brien, 2002). Forests cover roughly 27% of the state and occupy 19.4 million acres. These forests are comprised of 37 species of coniferous and hardwood trees. The majority of forestland is located above the Mogollon Rim with distinct areas scattered throughout the rest of the state. Pinyon-juniper woodlands, defined by the presence of one or more species of pinyon pine (*Pinus spp.*) and juniper (*Juniperus spp.*), are the most abundant

forest type in Arizona, occupying approximately 14.8 million acres, or 20.3% of the state. The rarest and most significant in ecological terms is riparian forest, which occupies less than one-half of 1% of Arizona's land. Arizona is also home to the largest contiguous stand of Ponderosa Pine in the world spanning the length of the Mogollon Rim.

Land ownership within Arizona is also quite diverse. Federal and state agencies and Native American tribes manage most of the lands. Only a small portion is privately owned. Arizona's 2010 Forest Action Plan is truly reflective of this diverse land base and draws on the strong relationships with many organizations and agencies (DFFM, 2015). This collaborative "all lands" approach is critical for successful near-term and long-term outcomes on the landscape.

4.2. Arizona's Climate

Climate describes an area's weather averaged over a period of time. Often, climate is described in terms of precipitation and temperature. Five key drivers of climate are: latitude, elevation, topography and proximity to large bodies of water, ocean circulation patterns, and atmospheric circulation patterns. Altogether, these factors give Arizona an arid to semi-arid climate. Arizona's temperatures are generally warmer compared to locations at similar latitudes elsewhere. Within the state, topographical influences produce various climate schemes with markedly different precipitation and temperature characteristics.

Although precipitation is possible any time of the year, most of Arizona's precipitation falls within two periods, the cool season (December through March) and the North American Monsoon (June 15 through September 30). Together, most areas of the state receive 80% or more of their typical annual precipitation within these two periods. Annual average precipitation totals range from just a few inches in southwestern Arizona up to 40 inches in the White Mountains of eastern Arizona.

Large ranges in daily temperatures are often observed across the state. Daily temperatures vary by as much as 40° F between the low desert areas around Yuma to the mountainous areas of Flagstaff. Diurnal temperature swings can also be large, especially for locations away from developed areas. The effects of the Urban Heat Island are well documented to show urban areas experience smaller diurnal temperature swings.

4.2.1. Arizona Climate Classification

Climate classifications are used to describe various climates. Classification schemes use different methodologies and criteria to generalize climatic conditions and/or other correlations.

For the purpose of the CFMP, Arizona is divided into three climate zones:

Low Desert: Hot summers, cool winters and precipitation 2 to 10 inches.

High Desert: Hot summers, cold winters and precipitation 5 to 10 inches.

Mountainous/Highlands: Warm summers, cold winters and precipitation 10 to 20 inches or more.

Two additional sub-zones describe areas where climate characteristics are less clear, limited in areal extent or heavily influenced by other anomalous factors:

Transition: Areas where climate characteristics begin to change from one climate zone to another. These areas may exhibit climate characteristics of multiple zones.

Microclimates: Small areas where climate conditions noticeably differ from the surrounding area.

4.3. Arizona's Weather Conditions

Weather is the set of various elements that are the result of numerous atmospheric conditions, patterns and other factors which vary across space and time. Weather focuses on short-term atmospheric conditions. In addition to the atmosphere, topography, landcover and the built environment can affect local weather conditions.

Most of the year, westerly atmospheric flow predominates while short-term conditions are influenced by periodic low-pressure troughs and high-pressure ridges. By mid-summer, easterly atmospheric flow becomes prevalent, indicating the arrival of the North American Monsoon.

Basic weather trends and conditions can be assumed from the general atmospheric pattern. Troughs are typically associated with cooler temperatures, increased wind speeds and potential for precipitation. Ridges are typically associated with warmer temperatures, afternoon breezes with enhanced diurnal/topographic influences. However, deviations from these assumptions do occur as actual weather conditions are affected by many other atmospheric properties and interactions.

On many days, local winds are the predominate surface wind pattern for many locations. These winds are influenced by diurnal tendencies, topography and the built environment, with implications on local weather conditions such as wind direction, wind speed and temperature.

Weather outcomes can vary over short distances, even on benign "blue sky" days. Awareness and understanding of many factors and their influences on local conditions is essential for fire weather.

4.4. Fire Mitigation Critical Issues

Arizona's population has grown for decades at a tremendous rate, with expectations for continued growth through mid-century and beyond (World Population Review, 2020). This expansion brings people into closer proximity to Arizona's forests, affecting these ecosystems in many negative ways. What were once remote forest wildlands with occasional visitors are becoming backyards and crowded playgrounds to expanding suburban neighborhoods. People migrating from urban areas are often choosing to live within or adjacent to forests and thus face new challenges such as fire, smoke, forest access, water supply, and land use issues. At the same time, distant metropolitan areas continue to increase demand for some of our forest's most precious commodities.

5. Wildfire Risk

5.1. Methodology for Enterprise-Wide Risk Assessment

The APS Wildfire Risk Assessment Analysis was developed to create a risk-informed decision framework to identify overall risk and determine potential mitigation plans and programs. The analysis also addresses the wildfire threat to the APS Transmission and Distribution system statewide and prioritizes areas for system improvements and grid hardening.

The subject matter expertise of APS Fire Mitigation specialists (FMS) and institutional knowledge played a key role in interpreting the basis for the framework data to estimate the trigger event (TE), consequence (C) and consequence impacts (CI). The FMS relied on three main categories and 15 subcategories including historical averages to estimate the TE, C and CI values creating the mathematical model for APS Fire Risk Index.

Each of the three main categories are weighted the same and each subcategory was given a value from one to 10 supported by publicly available data from fire-related institutions and land managers throughout the southwest.

The statewide service territory was divided into 10-mile by 10-mile grids capturing all APS transmission and distribution lines and assets. Grids were evaluated and assigned a value from one to five with .5 increments for nine risk index classifications. Each of the five (sub) categories has a point value of one to 10 with a possible total of 50 points, for a total of 150 points for all (main) categories. Example: max points: 50x3 = 150 highest rating. The aggregate score rating is assigned to each of the 10X10 mile geographic areas throughout the state.

Probability of Ignition (TE)	Probability a Fire will Carry (C)	Fire Impact (CI)
Fire History 9	Suppression Response 2	Community Risk 10
Weather/Climate 5	Fuel & Topography 10	Reliability 10
Fuel Arrangement 7	WUI 10	Environmental Impact 10
High Use Impact 3	Fuel Characteristics 7	Population 5
Fire Use/Rx 7	Fuel Loading 7	Reconstruction 5
(31)	(36)	(40)

Figure 2. Example APS Wildfire Risk Assessment scoring.

5.2. Fire Risk Assessment

(TE) *31+ (C) 36+ (CI) 40=107*- A value of (107) equals a Risk Index (RI) of (4)

Risk Index		
5	134	150
4.5	117	133
4	100	116
3.5	83	99
3	66	82
2.5	49	65
2	32	48
1.5	15	31
1	0	14

Table 1. Scoring index for each risk index and the associated breaks.

This assessment was created to develop a risk model representative of fire risk throughout the state and the potential impact to the APS T&D system. This is not a short-term analysis that will change from year to year and is intended to be the base model for long-term risk assessment. This risk assessment is unique to APS and the electrical utility given the threat presented and relevant considerations.

This framework and assessment are intended to support objectives and metrics to evaluate risk throughout transmission and distribution. The Fire Risk Index (FRI) is an unweighted scalar function that translates into a range or final FRI. A Delphi scoring system, with input from Fire SMEs around the state, publicly available data and institutional knowledge of fire fuels and wildland fire science here in Arizona, assisted in development of the FRI.

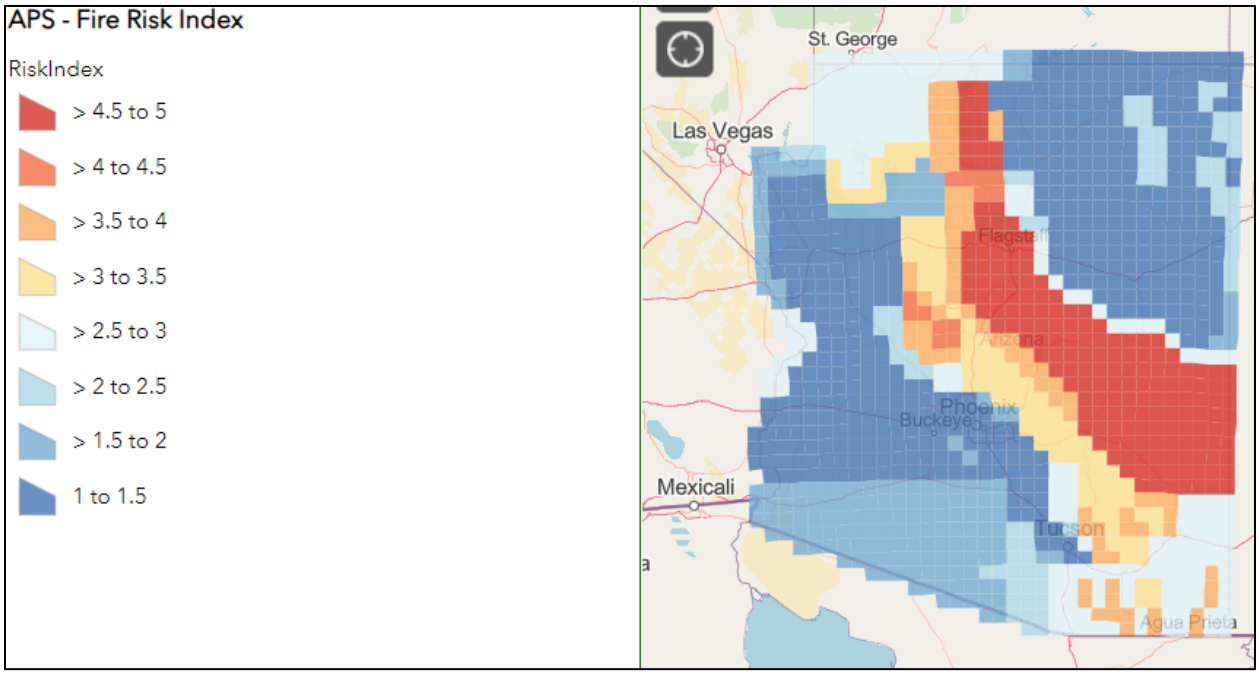


Figure 3. Map representing the APS Fire Risk Index.

To operationally implement the Risk Index across the APS system, the Fire Mitigation team has grouped Risk Indices into three tiers.

Tier 3 (Risk Index Ratings 4, 4.5, 5) represents the greatest risk and incorporates the most stringent mitigation measures, including the No-Reclose Strategy.

Tier 2 (Risk Index Ratings 2.5, 3, 3.5) also poses considerable risk and consists of significant mitigation measures to include the No-Reclose Strategy on most circuits in this tier level.

Tier 1 (Risk Index Ratings 1, 1.5, 2) is on the low end of the risk spectrum and would therefore have a reduced number of mitigation measures.

5.2.1. Ongoing Assessments & Risk Analysis

APS Fire Mitigation developed the Wildfire Risk Assessment based on vegetation conditions throughout the state to assess and implement an overall fire risk assessment for all transmission and distribution lines on APS systems. Within all line voltage ROW, APS supports the historical Arizona vegetation components of an open forest with discontinuous crowns and minimal fuel build-up separated by open spaces with grass-forb-shrub communities. This supports the frequent low-intensity fire regime that creates a mosaic pattern of vegetation in Arizona's diverse biotic community.

APS Fire Mitigation along with APS Transmission Operation Engineering has developed Fire Outage Sets. This report contains the technical study, recommended mitigation actions, monitoring elements, and contingencies associated with outages due to wildfire threats. APS has identified fire corridors that resulted in pre-contingency path reduction and post- contingency in a wildfire.

The Outage Data Intelligence (ODIT) system allows APS to pinpoint the root cause of the outage and determine mitigation measures. The system is used to track reliability performance with respect to common industry metrics including SAIFI, SAIDI and CAIDI. Data can be compiled, tracked and trended to give clues as to what conditions are affecting the system. Conditions include weather, performance, equipment issues, foreign interference, or fire related issues. OBJ

APS Distribution Operations also has the following protocol for switching: When in Preparedness Level (3) and greater, APS operations shall notify the Fire Duty Officer of any (relay) line sections (See Fire Risk Index). The No-Reclose Strategy (NRS) applies to all feeders associated with a risk index of 4 and above as well as most feeders from fire risk index 2.5-3.5. Prior to testing a Transmission or Distribution line section relayed, the circuit shall be reported to the Fire Duty Officer by DOC or ECC Supervisor. Any open relay shall have a complete line patrol done before closing for a test with a patrol following closing of the line section.

5.3. Emergency Planning and Preparedness

Emergency events are managed at the lowest level of the APS organization possible, within the scope, capabilities and resources within that level. Escalation occurs when additional resources or support is needed to assist in the management of the event. The concept of operations for this process is captured in the T&D Emergency Operations Plan (EOP).

5.4. Overview of Emergency Operations Plan

The T&D Emergency Operations Plan (EOP) is intended to provide a high-level overview of how an Emergency Event is managed within APS Transmission & Distribution (T&D). The T&D EOP has an application for all emergency events, from single-dock level response up to a T&D Incident Command Center (ICC) activation with full enterprise support at the Corporate Emergency Operations Center (CEOC) level.

APS emergency operations adopts an “all-hazards approach” focused on five key areas, Prevention, Mitigation, Preparedness, Response, Recovery. The T&D Hazard & Vulnerability Assessment (HVA) has identified the following top 10 items, based on the compilation and prioritization of the T&D Business Unit HVAs. The EOP contains an Emergency Response and Recovery Plan (ERRP) for each hazard to provide guidance for line of business level response.

6. Metrics and Underlying Data

6.1. Description of program targets

Program targets are measurements of activity used to show progress toward reaching the objective of reducing wildfire risk. The Fire Mitigation team tracks several program targets including Defensible Space Around Poles, Hazard Trees and System to Ground/Ground to System fires.

The Defensible Space Around Poles targets approximately 80,000 poles across distribution feeders with a Fire Risk Index of 1.5 or greater. 100% of these poles will be inspected on a two-year cycle beginning in 2024 (all were previously inspected on a three-year cycle). On average, 80% of the subject poles will require treatment. For quality control, a minimum of 20% of treated poles are audited. Tracking of implementation is accomplished through ArcGIS mapping and applications.

The Hazard Tree program targets line sections across T&D mid-routine cycle or those that have been recently impacted by wildfire and fall within a conifer vegetation type. These line sections are inspected for tree strike potential identification for removal. All hazard trees identified are mitigated within the calendar year. A minimum of 50% of hazard tree removals are audited for quality control.

All wildfires within a 10-mile radius of APS infrastructure are tracked. Those that are determined to be System to Ground fires are further tracked in reports and conveyed to System Health and Standards departments. The goal is to track and define any high-risk trends that may be causing ignitions. Wildfires that impact APS infrastructure (Ground to System) are also tracked. Wildfire tracking improves awareness, defines trends and aids in APS metrics.

6.2. Lessons Learned: Tracking Metrics in 2024

APS fire mitigation is committed to reducing the fire risk from two categories of wildfire as defined here. System to ground (STG) fires are those with an ignition source related to APS infrastructure. These events are tracked as a metric with year-over-year trends identified. STGs are reported by the Fire Mitigation team to the System Health and Standards department with additional business groups included as needed. Equipment failure is investigated, and a

determination of a system threat is identified for mitigation. Through this process, APS can identify equipment throughout the service territory with a history of potential failure and replace failed equipment with improved options.

System to Ground Fire: Defined as an ignition of ground fuels, flame or stage of combustion propagated by APS equipment or related system operations. Fire size is tracked in acres i.e., 1/10, ¼, ½ to one acre or greater.

STG data is tracked and classified the following Growth Phases:

1. Incipient Phase: Limited burn area to the point where sparks/ignition source contacted the ground and may have self-extinguished or suppressed.
2. Growth Phase: A fire that has grown beyond the incipient phase.

The other wildfire category APS monitors are Ground to System (GTS) fires; fires that have an ignition source unrelated to APS utility infrastructure but cause damage or impact to APS. This metric allows APS to identify potential hardening strategies to improve system resilience in the event of an encroaching wildfire. This metric is highly variable based on extraneous conditions but is essential in determining best management practices for system hardening and fire impact.

7. Baseline Ignition and Wildfire Risk Exposure

7.1. Common Weather Regimes

Weather conditions in the Southwest are typically hot, dry and windy. These conditions affect fire danger, with key weather elements of temperature, relative humidity and winds frequently near critical thresholds for prolonged periods. Changes in short-term weather trends are often subtle and difficult to detect, but even a slight departure from normal can have significant implications on daily fire weather concerns and fire danger.

Three weather regimes are known to exacerbate fire weather conditions: Meridional Ridge – Southwest Flow pattern, Short-Wave Train pattern, and the Zonal Ridge pattern. The fire danger peaks when a shortwave trough passes over or slightly to the north of the region. This occurs every spring and fall when Arizona is typically dry and windy.

However, Critical Fire Weather can occur any time of year in Arizona.

7.2. Current baseline state of service territory and utility

The APS service territory is diverse in ecotone, vegetation type and the challenges associated with delivering electrical services to customers safely and reliably. APS continues to proactively plan for a changing environment common to electrical utilities from generation, transmission and distribution of service in combination with a growing population in the state of Arizona. Balancing fire mitigation, advanced grid technologies, green production of energy, grid expansion, and planned maintenance has been paramount to addressing these challenges.

7.3. Fire ignitions tracked by district

Wildfire impact mitigation efforts within APS include tracking reports of wildland fires from federal, regional and local resources within 10 miles of APS service territory. Areas and feeders

of high fire risk have been identified through risk analysis to determine the most vulnerable areas of APS service territory based on a multitude of variables including fuel loads near and around feeders, receptibility of fuels, population, frequency of fires, and others. These high-risk feeders will be enabled with a no-reclose strategy and service to mitigate any potential for fire ignitions caused by the APS system.

Overall, APS has 13 operational districts that encompass the state of Arizona. Since 2020, 2,260 fires have been tracked and mapped throughout the districts by the FMT at APS. As an example, 16.79% of all fires tracked were mapped within the Coconino district. More so, Coconino district also contains 70 out of the 249 high-risk feeders in the state, with 58 of the feeders being in the highest risk index (5). The Coconino National Forest, within the district, also contains a portion of the largest, contiguous ponderosa pine forest, also incorporating the Kaibab National Forest. In comparison, the district with the third highest frequency of fires is Prescott, which is composed of the Prescott National Forest and 52 high-risk feeders. Table 2 shows the number of fires tracked by the FMT in each district since 2020. Common characteristics of the highest risk districts include frequency of fires, densely forested or vegetated areas, higher population, feeders in an area with a higher risk index, and feeders with a combination of any of the four.

	2020	2021	2022	2023	Total Fires by District	4-year Frequency (%)	4-year Average
Coconino	150	102	27	114	**393**	**16.79**	**98**
Navajo	40	37	9	35	**121**	**5.17**	**30**
Payson	75	65	22	54	**216**	**9.23**	**54**
Verde	49	36	15	28	**128**	**5.47**	**32**
Prescott	130	120	40	85	**375**	**16.02**	**94**
La Paz	16	13	5	7	**41**	**1.75**	**10**
Yuma	30	25	14	20	**89**	**3.80**	**22**
Wickenburg	10	8	3	12	**33**	**1.41**	**8**
Metro	196	100	27	84	**407**	**17.39**	**102**
Buckeye	36	18	5	28	**87**	**3.72**	**22**
Mountain	81	51	13	43	**188**	**8.03**	**47**
Pinal	57	20	3	25	**105**	**4.49**	**26**
Cochise	57	37	17	47	**158**	**6.75**	**40**
Total Fires	**927**	**632**	**200**	**582**	**2341**		

Table 2. Fire occurrence by APS State District.

8. Fire Mitigation Meteorology

8.1. Fire mitigation meteorology support

Meteorology at APS considers fire mitigation throughout the calendar year and provides a multitude of weather support and intel related products across the enterprise. Issuance of semiweekly weather and fire weather briefings discuss weather conditions pertaining to the next seven days. The briefings contain a high-level synoptic weather overview, a summary of primary weather hazards and impacts, routine forecast graphics, and links to original forecast documents and an internal weather support webpage.

8.2. Key weather elements, impacts and hazards

Consideration of several weather elements and their importance across the APS enterprise is essential. Weather awareness requires an understanding of how weather elements affect the various roles and scopes across the enterprise. **A weather threat index is used to communicate**

the potential for adverse weather conditions to impact various aspects of the enterprise by APS district. For Fire Mitigation, the potential for critical fire weather is crucial, with careful consideration of temperatures, winds, moisture, precipitation, thunderstorms, lightning, sky conditions, winter weather, and other elements as needed.

8.3. Graphical and Narrative Forecasts

Forecasts depicting weather implications on circuits by APS district including Fire Weather, Thunderstorm, Winter Storm, Temperature and Non-Storm Wind Outlooks issued semiweekly; and other specialized forecasts, including spot forecasts, as needed.

8.4. Additional support functions

8.4.1. Fire mitigation meteorology SharePoint

Internal webpage with access to current and past forecasts, outlooks, analysis, and other weather support. SharePoint also contains the Weather Outlook and Situational Awareness Dashboard.

8.4.2. Weather outlook and situational awareness dashboard

The Weather Outlook and Situational Awareness Dashboard (WOSAD) is an ESRI dashboard containing several publicly available weather observations, analyses and outlooks to provide additional top-level weather support as needed. All products are produced, shared and managed by the National Oceanic and Atmospheric Administration (NOAA) and National Weather Service (NWS) for public use. Only the WOSAD display is managed by Fire Mitigation Meteorology.

8.5. Situational awareness and forecasting

Semi-weekly internal weather and fire weather forecasts and periodic seasonal weather outlooks and reviews are vital to enterprise situational awareness. The WOSAD also provides access to NOAA radar and several NOAA weather forecasts, outlooks and observations. The FM Meteorology SharePoint site serves as a central access hub for current and past weather support.

At times, business operations may require detailed short-term weather support to be prioritized. Examples of support include spot forecasting, nowcasting, weather radar analysis, and current weather observations.

9. Wildfire Mitigation Strategy

The APS fire mitigation strategy can be categorized into three elements; prevention, mitigation and response. Each element plays a crucial role in reducing the overall risk of wildfire to APS. Within each of these elements are a variety of policies, tactics and programs designed to prevent the occurrence of wildfires, minimize the impacts of wildfire and create a common operating picture across APS business units on how to respond to wildfire and wildfire risk. The APS fire Mitigation team provides wildfire subject matter expertise to the company and oversees the Fire Mitigation programs such as the Defensible Space Around Poles program and the Hazard Tree program.

Prevention – prevention refers to the efforts made within APS to eliminate wildfires from starting all together. Examples include the No-Reclose Strategy (NRS), the Hazard Tree program and the APS District Preparedness Levels and work restrictions during elevated fire conditions. APS Forestry Fire and Resource Management also works year-round maintaining APS Rights-of-Ways (ROW) to prevent vegetation from contacting lines that could cause not only outages, but wildfires.

Mitigation – mitigation refers to efforts made within APS to minimize the impacts of wildfires. Mitigation efforts include programs like Defensible Space Around Poles (DSAP) which removes combustible fuels from around equipment poles and reduces the chances of a pole burning. The APS Fire Mitigation team also provides on-scene representation (fire liaison) during a wildfire incident to coordinate efforts with firefighting agencies which provides safety for firefighters and leads to faster restoration times.

Response – response refers to actions taken across APS before, during and after a wildfire. APS and the Fire Mitigation team monitor conditions and respond by assigning appropriate preparedness levels to each district. During an active wildfire, APS monitors and coordinates with on-scene personnel to determine the need to stand up the APS Incident Management team and assess needs for restoration.

9.1. Risk assessment and mapping

The Fire Risk Index (FRI), as previously described in Chapter 4, is the base model for long-term risk assessment across the APS T&D system. The analysis was developed to create a risk-informed decision framework to identify overall risk and determine potential mitigation plans and programs. The Fire Risk Index is further used to ascertain priorities within mitigation programs. This is accomplished with ArcGIS mapping. The FRI is depicted as a layer in ArcGIS and can be cross referenced with other layers or features to determine the applicable risk and assist in decision making based on that risk.

9.2. Wildfire Call, Plan and Respond (CPR)

Wildfire Call, Plan and Respond is the protocol APS employees and contractors are to take in the event they encounter a wildfire. The protocol is centered on calling and reporting the incident, planning for worst case scenario and responding appropriately. A description of the process is listed in the below figure. This protocol is to be reviewed during pre-job briefings when in preparedness level 2 and greater ensuring all field workers are aware of the process.

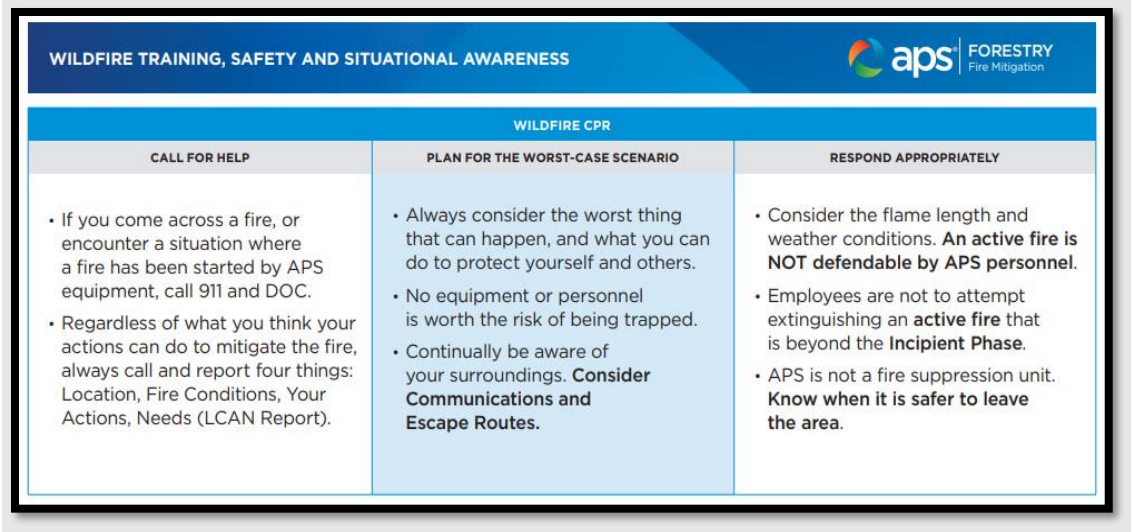


Figure 4. Wildfire CPR diagram.

9.3. Wildland indices as metrics for preparedness levels

The APS Fire Mitigation program relies on scientific data collected to help predict potential fire danger and the threat to the grid. Eight important calculations are utilized in assessing current Preparedness Levels and are provided to APS by the Public Land Manager. A short description of each index is presented below.

Ignition Component (IC) is a rating of the likelihood that a firebrand will ignite a fire if it lands on a receptive fuel bed. This metric provides an understanding of the potential for ignition based on current temperatures and fuel moisture content. Ignition component data is derived from the Interagency Dispatch Centers as well as available on the Southwest Coordination Center (SWCC) website.

7-Day Fire Potential outlook is an indicator of trends and expected conditions over the next week and is largely a function of fuel conditions, weather and resource availability.

Fire Weather Forecast including winds, relative humidity and temperature are indicators of potential fire behavior and are available from the National Weather Service.

The Energy Release Component (ERC) is based on the estimated available energy released per unit area in the flaming front of a fire. The day-to-day variations of the ERC are caused by changes in the moisture contents of the various fuel classes, including the 1,000-hour time lag class. The ERC is derived from predictions of the rate of heat release per unit area during flaming combustion and the duration of flaming.

Dead Fuel Moisture - 1000 hr. is an indicator of long-term drought and overall fuel conditions. Fuel moisture content is the water content of a fuel particle expressed as a percent of the oven dry weight of the fuel particle. This measurement is representative of the fuels susceptibility to carry fire, and the probability the fuel will ignite given an ignition source.

6-10 Day Precipitation Outlooks captured from the Climate Prediction Center are considered as well for expected conditions and potential for progression through the preparedness levels.

Publicly Managed Lands Fire Restrictions is the current fire restriction level by federal, state and municipal agencies. The current restriction and the associated industrial plan are communicated during zone restriction calls and can be found on the Southwest Area Fire Restrictions Dashboard.

Fire Danger Rating is the overall national fire danger rating system (NFDRS) current rating for publicly managed lands and is a part of the decision matrix. NFDRS is a system that allows fire managers to estimate today's or tomorrow's fire danger for a given area and links an organization's readiness level to the potential for fire conditions. NFDRS Adjective ratings range from low to extreme.

9.4. District preparedness levels

In close coordination with state and federal agencies, APS Fire Mitigation specialists establish Preparedness Levels throughout the calendar year to proactively prepare and respond to wildfire incidents. Preparedness Levels are dictated by fuel and weather conditions, current and expected fire activity and potential impact to APS systems and stakeholders. This document does not replace or supersede the APS ConvergePoint document “Elevated Fire Conditions.” It is intended to document how the Preparedness Levels are determined and outline the workflow's complexity. Not all criteria within each level must be met to warrant a shift in level but are intended to be guidelines for decision making. The decision support matrix is used with subject matter expertise to warrant a change in preparedness level.

The Preparedness Levels are evaluated at least monthly, and the frequency of evaluation increases as conditions warrant. Evaluation of current wildfire indices is utilized for both increases and decreases in the Preparedness Level. Eight wildfire indices are used in evaluating the current Preparedness Level for each APS geographic district. A decision support matrix was created to document changes in Preparedness Levels throughout the year in which all indices are monitored and utilized to calculate the appropriate Preparedness Level. Data used in evaluations are derived from publicly available sources including Southwest Coordination Center (SWCC), National Interagency Fire Center (NIFC) and APS proprietary information. Each wildfire metric is evaluated and scored from one to five with five representing the greatest risk, the cumulative score of all metrics is used to determine the current Preparedness Level for each APS District.

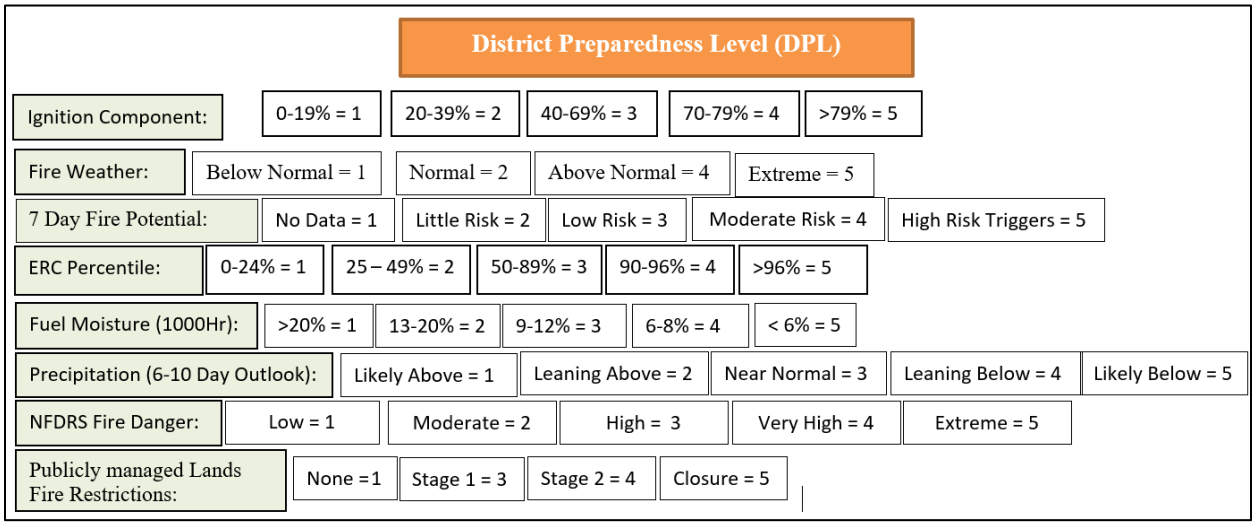


Figure 5. Decision Support Matrix for APS Preparedness Level determination.

The Preparedness Levels range from one to five, with five being the highest level and representative of the most extreme fire conditions. Each Preparedness Level has specific management directions and operational protocols. As the Preparedness Levels change, several, but not all, indicators must be met. The current District Preparedness Level shall meet any land agency requirements within the APS transmission and distribution system to ensure safety and compliance. The APS Preparedness Level is set per each APS district. The 13 APS districts vary geographically across the state by fuels, topography and weather conditions, and therefore are analyzed individually.

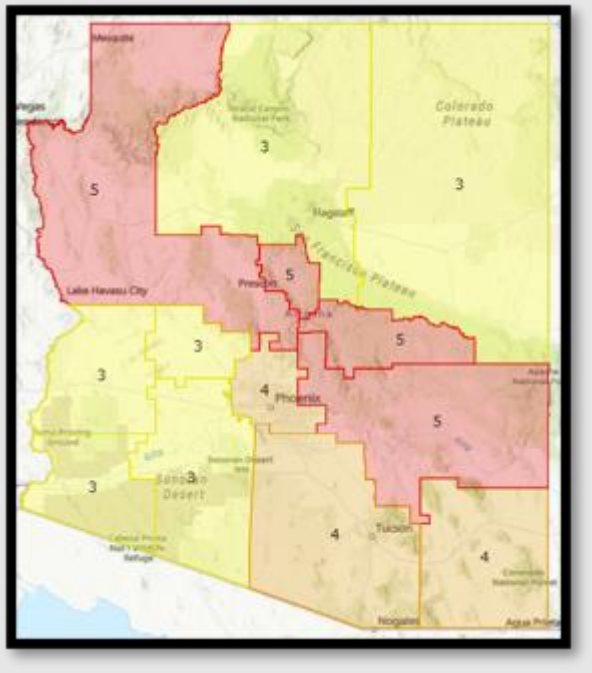


Figure 6. Example representing APS State Districts in which each has an associated p-level assigned.

The current APS District Preparedness Level for each district is found on the APS Fire Awareness Dashboard, Fire Mitigation SharePoint and is communicated via email anytime there is a change in the Preparedness Level.

9.5. Preparedness Level Work Restrictions

The following descriptions represent the APS Preparedness Levels, the associated work requirements and potential impacts to work plans. This is not all inclusive and additional requirements may be needed to meet the standard of exemptions by Publicly Managed Land Agencies in Arizona. APS Lands department and Fire Mitigation may need to secure and facilitate exemptions from Publicly Managed Lands to perform emergent work in the event of Elevated and Extreme fire conditions. Each APS district will always be assigned a Preparedness Level and APS employees and contractors shall know the current Preparedness Level and requirements for the district in which they are working. APS employees and contractors acting on behalf of APS shall meet these requirements:

Preparedness Level – 1 Normal Operating Conditions

Low Fire Conditions

- No industrial plan requirements
- Maintain situational awareness

Preparedness Level – 2 Industrial Plan A

Increasing Fire Conditions

- Increasing awareness and preparation
- Fire mitigation tools must be present on vehicles and job sites - the purpose of the tools is: 1) mitigate fire potential by removing fuels with hand tool and/or wetting area 2) extinguish an incipient fire
    - 2 – 10# ABC fire extinguishers
    - 1 – backpack pump
    - 5 – gallon minimum of additional water
    - 1 – hand tool (round point shovel) per crewmember
    - Dependable form of communication (cell phone or radio)
- Review Wildfire CPR during pre-job briefs
- No fire guard required, should be considered

Preparedness Level – 3 Industrial Plan B

Elevated Fire Conditions

- Fire mitigation tools must be present on vehicles and job sites
    - 2 – 10# ABC fire extinguishers
    - 1 – backpack pump
    - 5 – gallon minimum of additional water
    - 1 – hand tool (round point shovel) per crewmember
    - Dependable form of communication (cell phone or radio)
- Review Wildfire CPR during pre-job briefs
- Fire guard required on all job sites
- No-Reclose Strategy (NRS) enacted
- No smoking
- Restrictions and closures may influence work plans

Preparedness Level – 4 Industrial Plan C

Very High Fire Conditions

- Fire guard required on job sites
- Emergent work as necessary
- Pre-Emergent work shall be completed prior to 0900 and/or resume at 2000 hours
- Emergent and pre-emergent work, every effort shall be made to give crew locations

- All other work shall stop until approval is obtained by T&D leadership during the Work Approval Review Meeting (WARM) and possible Lands department approval
- Fire mitigation tools must be present on vehicles and job sites
    - 2 – 10# ABC fire extinguishers
    - 1 – backpack pump
    - 5 – gallon minimum of additional water
    - 1 – hand tool (round point shovel) per crewmember
    - Dependable form of communication (cell phone or radio)
- Review wildfire CPR during pre-job briefs
- No-Reclose Strategy (NRS) enacted
- No smoking
- Restrictions and closures may influence work plans

Preparedness Level – 5 Industrial Plan D

Extreme Fire Conditions

- Fire guard required on job sites
- Emergent work as necessary
- With pre-approval, specific operations may continue with additional mitigation measures in place and approval from APS Management and Fire Mitigation team during the Work Approval Review Meeting (WARM) and possible Lands Department approval.
- Emergent and pre-emergent work, every effort to shall be made to give crew locations
- Fire mitigation tools must be present on vehicles and job sites
    - 2 – 10# ABC fire extinguishers
    - 1 – backpack pump
    - 5 – gallon minimum of additional water
    - 1 – hand tool (round point shovel) per crewmember
    - Dependable form of communication (cell phone or radio)
- Review Wildfire CPR during pre-job briefs
- No-Reclose Strategy (NRS) enacted
- Restrictions and closures may influence work plans
- No smoking

9.6. Red Flag Standing Order

APS has adopted a standing order in which additional precautions are put in place during red flag warning periods as defined by the SWCC Annual Operating Plan in conjunction with the NWS.

A Red Flag Warning is defined as a critical combination of dry fuels and weather conditions that support extreme fire behavior. Red Flag Warnings are issued to identify Red Flag events which are highly likely, or imminent, usually within the following 12–48-hour period. Fire Weather Watches are issued to identify the elevated threat of similar conditions during the following 18–96-hour period. Specific objective criteria for Red Flag events are listed below. Fire management may also request that Red Flag Warnings or Fire Weather Watches be issued under extenuating circumstances (i.e., fuel conditions so severe that marginally windy and dry conditions would lead to extreme fire behavior).

Criteria: standardized criteria for issuance of Fire Weather Watches and Red Flag Warnings in the Southwest Area are a combination of weather and fire danger ratings.

**In the absence of overriding input from fire management personnel, a Red Flag event is defined by the following conditions occurring simultaneously for three or more hours across any portion of a fire weather zone:

1) 20-foot winds sustained 20 mph or greater, or gusting to 35 mph or greater

2) Relative humidity of 15% or lower

3) NFDRS adjective fire danger rating of "High" or higher

A Red Flag Warning is indicative of extreme fire weather conditions and additional precautions will be taken by APS operations regardless of current Preparedness level (P-level) in districts where a Red Flag Warning has been issued. When a Red Flag Warning is issued, the following measures shall be taken for the entire day (6:00am – 11:59pm) within the district(s) affected by the Red Flag Warning:

- All vehicles shall have all P2-equivalent fire mitigation tools, including fire extinguishers, backpack pump, hand tool, and an extra five gallons of water.
- All Non-emergent Field Work (includes Pre-emergent Field Work and Planned Field Work) shall be deferred until after the red flag warning has expired (11:59 PM)
- Emergent Field Work can occur with notification from maintenance department to T&D Leadership including the local Manager and Fire Mitigation and must include a fire watch for 3 hours post completion of the work.
- DOC Operations or ECC Operations shall notify via email the Fire Mitigation Duty Officer of any line trip or recloser operation. If there is known line down, or fire reported, an immediate phone call will be made to the Fire Mitigation Duty Officer
- Any line trip resulting in an open circuit shall have a complete line patrol completed before closing for a test.

Red Flag Warnings will be communicated via email from the Fire Mitigation team to the following DLs:

- Fire Notification
- DOC Shift Supervisors
- ECC Shift Supervisors
- T&D Leadership

9.7. APS Wildfire Awareness Dashboard

The APS Wildfire Awareness Dashboard is used to track all current incidents in the state of Arizona with information populated from Arizona Fire Dispatch Centers and is updated as

incidents develop. This information provides real-time analysis of the potential impact to the APS system and situational awareness to APS employees and contractors working in the field. The dashboard allows APS operations to make informed decisions on the wildfire risk to any aspect of the APS grid or support systems. The APS Wildfire Awareness Dashboard also contains real-time weather station data, radar and lightning strike data to assist with informed decision making. The current APS Fire Mitigation Duty Officer is listed on the dashboard and updated daily.

As reports come from the dispatch centers, the Fire Mitigation Duty Officer determines the threat level of each incident. Threat levels are as follows:

- **For Information Only**: No threat currently associated with this incident
- **Potential**: Within 10 miles and DO is monitoring
- **Credible**: Within 10 miles and greater likelihood to impact APS infrastructure
- **Immediate**: Currently impacting APS infrastructure

Impacts include but are not limited to: May burn into ROW, may cause outage, may require a patrol, may burn down poles/towers, may require response, smoke impacts.

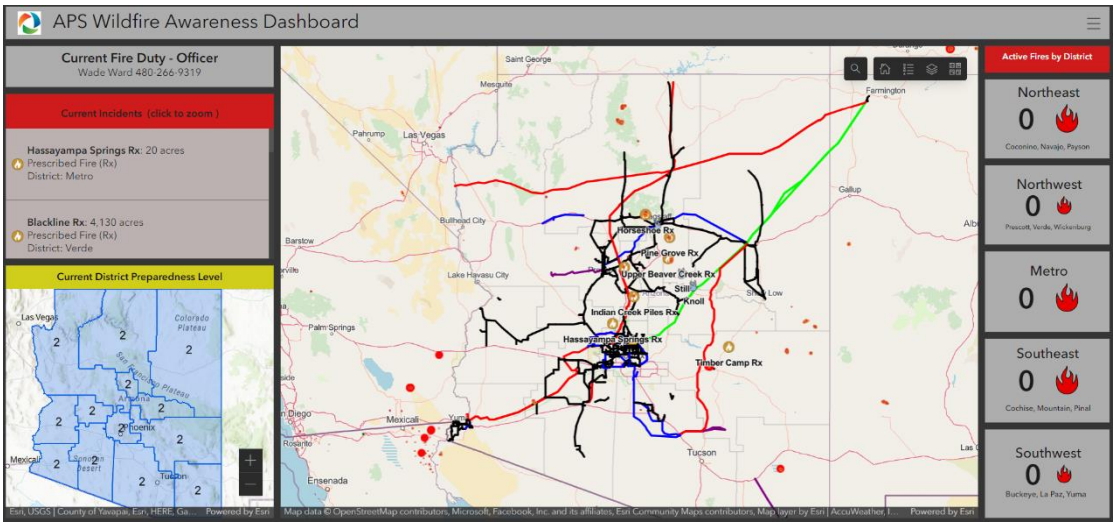


Figure 7. Example of APS Wildfire Awareness Dashboard

9.8. Situational awareness and forecasting

Semi-weekly internal weather and fire weather forecasts and periodic seasonal weather outlooks and reviews are vital to enterprise situational awareness. The Weather Outlook and Situational Awareness Dashboard (WOSAD) also provides access to real-time National Oceanic and Atmospheric Administration (NOAA) NOAA radar and several weather outlooks. The FM Meteorology SharePoint site serves as a central access hub for current and past weather support.

At times, business operations may require detailed short-term weather support to be prioritized. Examples of support include spot forecasting, nowcasting, weather radar analysis, and current weather observations.

9.9. Camera network and weather station integration

A small network of pan-zoom-tilt cameras and weather stations are in a pilot project to test the feasibility of acquiring detailed weather and fire weather conditions pertaining to APS initiatives. Looking ahead to 2024 APS will begin deploying fifteen new cameras and weather stations across the service territory.

The cameras are intended for the Fire Mitigation team to gather situational awareness with regards to wildfires and infrastructure.

Weather stations will be mounted on poles and around other APS equipment to provide real time weather observations. Since publicly available weather data is incredibly sparse, especially related to APS infrastructure, these observations will provide the Fire Mitigation team the ability to monitor what weather conditions are impacting APS equipment at any given moment. This will provide the ability to inform the Duty Officer (DO), Incident Command, APS meteorology, and other decision makers regarding ongoing hazardous weather conditions to the APS system.

9.10. Fire science and climate adaptation

Moving forward with implementation of fire science modeling, a Weather Threat Index, Fire Threat Index and identification of key weather parameters will help APS decision makers with the protection of life and property among the APS enterprise and the public.

9.11. Fire Threat Index

The Fire Threat Index (FTI) incorporates fire weather parameters including maximum temperature, minimum temperature, maximum relative humidity, minimum relative humidity, wind direction, wind speed, wind gusts, live fuel moisture, dead fuel moisture, and the potential for thunderstorms. Additionally, many indices will be considered including the Keetch-Byram Drought Index (KBDI), Energy Release Components (ERCs), Burning Index (BI), Ignition Component (IC), the National Seven-Day Significant Fire Potential Forecast, the National Fire Danger Rating System (NFDRS), the United States Geological Survey (USGS) Wildland Fire Potential Index (WFPI), and the Severe Fire Danger Index (SFDI). Each of these will be weighted to quantify the risk associated with the hazards of wildfire to APS and the public and the District Preparedness Levels.

9.12. Fire Growth Potential (Fire Rate of Spread)

The Fire Growth Potential (FGP) will combine the Burning Index (BI) and Wind Gusts (WG) to assist in making operational decisions that will reduce the fire threat and its associated risks. This tool converts environmental, statistical and scientific data into an easily understood forecast of the short-term fire threat that could exist for different geographical areas in the APS service territory.

9.13. Weather Threat Index (Ongoing Weather Forecast)

The Weather Threat Index (WTI) communicates the daily potential for hazardous weather and/or weather-related impacts resulting from forecast weather conditions. The WTI output is a sliding

scale derived from weather observation and forecast inputs. These values assist in producing the BOW and EOW forecasts.

9.14. Fire Potential Index

The Fire Potential Index (FPI) will be an aggregate score of the Fire Growth Index, and fire modeling technology (WFA) to determine the fire potential for operational protocols . This will include outputs for WFA modeling, Burn Index and Wind speeds and wind gusts.

10. Operations during elevated fire conditions (crews and contractors)

10.1. Field Operations during elevated fire conditions

The APS mission is to serve customers with clean, reliable and affordable energy. APS understands it is a privilege to serve the human and natural environment of Arizona. The CFMP is focused on safety and reliability metrics to ensure protection for both our employees, customers and all stakeholders.

APS recognizes in times of extreme fire conditions, measures need to be put in place to protect Arizona's natural resources and the infrastructure, including public safety and national security interests.

APS supports measures implemented to protect Arizona's forests, rangelands and water ways such as restrictions and closures. During these times, APS increases situational awareness and support to prevent fire ignitions. To provide safe and reliable electricity, there is a constant need for emergent and pre-emergent work that must be completed every day to maintain safe grid operation. A brief description of emergent and pre-emergent work is listed below.

What is "pre-emergent" work?

Work that shall be completed because of an operational situation that poses a threat to the safety and reliability* of the grid in the immediate future.

Example: (not limited to, or exclusive to the following)

A broken crossarm needs to be replaced before a wire contacts the ground, causing a fault or any potential unsafe conditions to the electric grid.

What is "emergent" work?

Work that shall be completed because of an operational situation currently posing a threat to the safety and reliability* of the grid.

Example: (not limited to, or exclusive to the following)

Wire on the ground or any equipment issues that could result in unsafe conditions or service to the electric grid.

*Arizona Corporation Commission (ACC), obligation to serve R14-2-903 CC&N

Preparedness Level – 3 Industrial Plan B

Elevated Fire Conditions

- Fire mitigation tools must be present on vehicles and job sites
  - 2 – 10# ABC fire extinguishers
  - 1 – backpack pump
  - 5 – gallon minimum of additional water
  - 1 – hand tool (round point shovel) per crewmember
  - Dependable form of communication (cell phone or radio)
- Review Wildfire CPR during Pre-Job Briefs
- Fire guard required on all job sites
- No-Reclose Strategy (NRS) enacted
- No smoking
- Restrictions and closures may influence work plans

Preparedness Level – 4 Industrial Plan C

Very High Fire Conditions

- Fire guard required on job sites
- Emergent work as necessary
- Pre-emergent work shall be completed prior to 0900 and/or resume at 2000 hours
- Emergent and Pre-emergent work, every effort shall be made to give crew locations
- All other work shall stop until approval is obtained by T&D leadership during the Work Approval Review Meeting (WARM) and possible Lands Department approval
- Fire mitigation tools must be present on vehicles and job sites
  - 2 – 10# ABC fire extinguishers
  - 1 – backpack pump
  - 5 – gallon minimum of additional water
  - 1 – hand tool (round point shovel) per crewmember
  - Dependable form of communication (cell phone or radio)
- Review Wildfire CPR during pre-job briefs
- No-Reclose Strategy (NRS) enacted
- No smoking
- Restrictions and closures may influence work plans

Preparedness Level – 5 Industrial Plan D

Extreme Fire Conditions

- Fire guard required on job sites
- Emergent work as necessary
- With pre-approval specific operations may continue with additional mitigation measures in place and approval from APS Management and Fire Mitigation Team during the Work Approval Review Meeting (WARM) and possible Lands Department approval.
- Emergent and pre-emergent, every effort to shall be made to give crew locations

- Fire mitigation tools must be present on vehicles and job sites
  - 2 – 10# ABC fire extinguishers
  - 1 – backpack pump
  - 5 – gallon minimum of additional water
  - 1 – hand tool (round point shovel) per crewmember
  - Dependable form of communication (cell phone or radio)
- Review Wildfire CPR during Pre-Job Briefs
- No-Reclose Strategy (NRS) enacted
- Restrictions & closures may influence work plans
- No smoking

To ensure safety during preparedness level 4 and preparedness level 5, APS employees and contractors will continue to provide safe and reliable delivery of electricity by increasing mitigation measures. All work will be evaluated during the Work Approval Review Meeting (WARM) for additional mitigation measures including, but not limited to the following:

- Additional fire guard measures taken
- Work plan and project adjustment
- Contractor work plan moved or shutdown
- Increased communications to the public and stakeholders
- One point of contact with APS fire mitigation staff
- Check in check out protocol with publicly managed lands

The WARM will occur during preparedness levels 4 and 5 and consist of representatives from APS Fire Mitigation team, Transmission and Distribution Leadership as well as others. This meeting will also serve as an opportunity to determine priority of work and additional mitigation measures required to continue operation of the grid.

10.2. Fire Guard in Industrial Plan Restrictions

A fire guard is a component of the APS Preparedness Levels. The fire guard is not dependent on land ownership and is required whether work is occurring on agency or private land throughout the state. While the restriction originates from the Forest Service, APS has adopted it across the entire service territory during Preparedness Level 3 and greater. Given how expansive this restriction is, this document will provide practical guidance.

- A fire guard is in effect under Industrial Plans B through D (Preparedness Levels 3-5) and during Red Flag Conditions. APS and contract crews shall utilize a fire guard in these conditions.

- An additional 20 gallons of water is required for the fire guard on top of the required five gallons with the fire mitigation tools in (P2). A total of 25 gallons of water is required on site with the fire guard.

The intention of a fire guard is to mitigate the accidental ignition of fuels and the spread of fire due to the industrial nature of our work. Embers can smolder for some time without igniting, which is why it is important to provide a fire guard and not assume any risk.

A fire guard consists of:

- Three hours of continual watch after any work that potentially could have created an ignition source is complete, such as welding, cutting, grinding, or sparks produced by APS equipment.
- A fire guard can be provided by any APS employee or contractor who has the proper fire tools and the ability to act if necessary.
- When providing a fire guard, fire tools shall be within easy reach and in close proximity.
- No traveling or parking off established roads and avoid idling engines.
- Make sure undercarriage and exhaust of vehicles is devoid of vegetation.
- Create a safe space to set hot saws and other equipment down in your work site, per APS Accident Prevention Manual (APM).
- No smoking.

When to use and not use a fire guard:

- Work activity creates a spark, i.e., welding, cutting, grinding, or sparks are produced by APS equipment. (Three hours of continual watch after above type work is completed)
- If you are on private property in a Wildland Urban Interface/populated area and the landscape is irrigated and boxed in by concrete and asphalt or sand and rock, your risk of ignition is mitigated and a fire guard is not needed.
- A fire guard is not necessary in restricted or closure areas if the purpose and work performed in that area has not caused/created a concern for potential ignition.
- If you are on the outskirts of a downtown/populated area on private property and the landscape looks just like the agency land on the other side of the fence, a fire guard shall be provided.

10.3. Red Flag Standing Order

APS has adopted a standing order in which additional precautions are put in place during red flag warning periods as defined by the Southwest Coordination Center Annual Operating Plan in conjunction with the National Weather Service

A Red Flag Warning is defined as a critical combination of dry fuels and weather conditions that support extreme fire behavior. Red Flag Warnings are issued to identify Red Flag events which are highly likely, or imminent, usually within the following 12–48-hour period. Fire Weather Watches are issued to identify the elevated threat of similar conditions during the following 18–96-hour period. Specific objective criteria for Red Flag events are listed below. Fire management may also request that Red Flag Warnings or Fire Weather Watches be issued under extenuating circumstances (i.e., fuel conditions so severe that marginally windy and dry conditions would lead to extreme fire behavior).

Criteria: standardized criteria for issuance of Fire Weather Watches and Red Flag Warnings in the Southwest Area are a combination of weather and fire danger ratings.

**In the absence of overriding input from fire management personnel, a Red Flag event is defined by the following conditions occurring simultaneously for three or more hours across any portion of a fire weather zone:

1) 20-foot winds sustained 20 mph or greater, or gusting to 35 mph or greater

2) Relative humidity of 15% or lower

3) National Fire Danger Rating System adjective fire danger rating of "High" or higher

A Red Flag Warning is indicative of extreme fire weather conditions and additional precautions will be taken by APS operations regardless of current Preparedness level (P-level) in districts where a Red Flag Warning has been issued. When a Red Flag Warning is issued, the following measures shall be taken for the entire day (6:00am – 11:59pm) within the district(s) affected by the Red Flag Warning:

- All vehicles shall have all P2-equivalent fire mitigation tools, including fire extinguishers, backpack pump, hand tool, and an extra five gallons of water.
- All Non-emergent Field Work (includes Pre-emergent Field Work and Planned Field Work) shall be deferred until after the red flag warning has expired (11:59 PM)
- Emergent Field Work can occur with notification from maintenance department to T&D Leadership including the local Manager and Fire Mitigation and must include a fire watch for 3 hours post completion of the work.
- DOC Operations or ECC Operations shall notify via email the Fire Mitigation Duty Officer of any line trip or recloser operation. If there is known line down, or fire reported, an immediate phone call will be made to the Fire Mitigation Duty Officer.
- Any line trip resulting in an open circuit shall have a complete line patrol completed before closing for a test.

Red Flag Warnings will be communicated via email from the Fire Mitigation team to the following DLs:

- Fire Notification
- DOC Shift Supervisors
- ECC Shift Supervisors
- T&D Leadership

10.4. No-Reclose Strategy

As part of the comprehensive fire mitigation efforts, APS implements adjustments to our automatic protection operations, including breaker and recloser to non-reclose settings during elevated fire conditions (P3 and above).

Automatic protection operations in high fire risk areas are proactively changed during elevated fire conditions to mitigate these risks. APS field personnel will be required to analyze additional system data and perform more foot patrols and inspections to help identify potential hazards before de-energized lines are re-energized. APS has proactively implemented these protocols and

line patrols to help mitigate the risk of wildfires being caused by downed conductors or damaged equipment.

During elevated fire conditions (P3 and above), APS will enact operational settings and protocols (TD-DO-PRD-A035). APS Fire Mitigation Specialist (FMS) shall notify the Distribution Operations Center (DOC) and Energy Control Center (ECC) along with all Construction and Maintenance departments throughout the state of work restrictions via email. The DOC and ECC will implement testing and reclose protocols. Testing of any distribution line section relayed shall be reported by circuit immediately to the APS FMS. Transmission line sections included in the No-Reclose Strategy are reported via email from the ECC transmission system log to the APS FMS. The following operational settings and protocols apply during elevated fire conditions.

The APS No-Reclose Strategy in high-risk areas is being implemented to protect the public and the communities we serve. While these measures may result in outages for customers fed by certain high-risk feeders, it will also help mitigate the potential risk of wildfires. The goal of fire mitigation settings is to prevent fire from ever happening. The second goal is to provide safe and reliable electricity to the communities APS serves while at the same time ensuring firefighter safety around our system in the event of a fire. As part of the APS Promise, APS will continue to keep the environment, our customers and our employees as our critical areas of focus.

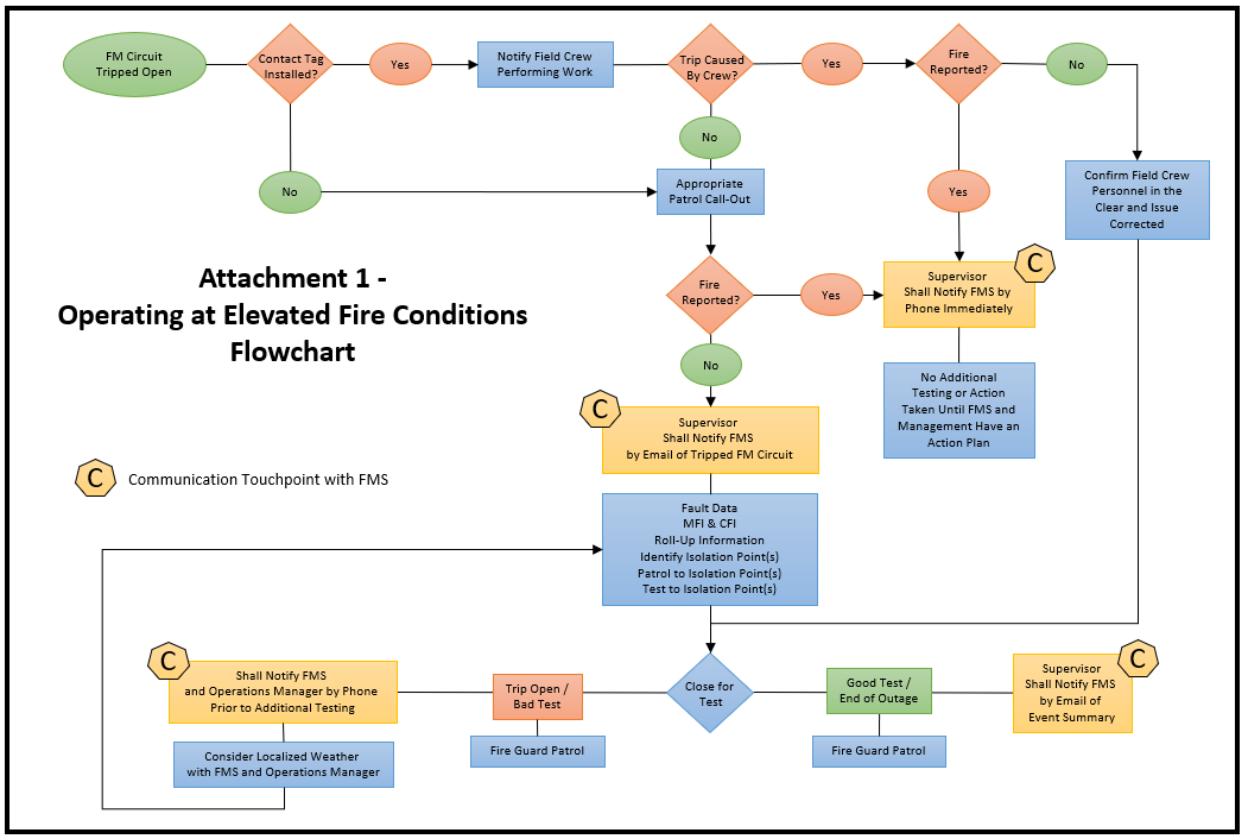


Figure 8. Workflow for DOC and ECC during No-Reclose Strategy (NRS)

10.5. APS and the Incident Command System

The Incident Command System (ICS) is a standardized approach to the command, control and coordination of emergency response and provides a common hierarchy to allow responders from multiple agencies to be effective. APS has adopted the use of ICS during response to a wildfire incident.

In the event of a wildfire, firefighting agencies will use ICS to manage firefighting efforts, APS will stand up its own team using the ICS organization to coordinate the response and actions taken by APS. In order to maintain communication and coordinate efforts between the two organizations, APS integrates into the ICS organization on the fire in the form of a Liaison. The Liaison is a single person point-of-contact who works with fire personnel to coordinate efforts between fire crews and APS crews. This close coordination provides safer working conditions for both firefighters and APS crews and also leads to faster incident stabilization and power restoration.

10.5.1. Training and seasonal awareness

At APS, we believe the overall situational awareness of the company and its appropriately trained workforce can be the first line of defense against wildfires. Our Fire Mitigation Training program, including the electronic learning modules, have developed a culture of fire awareness and readiness focused on preparedness, awareness and continual education.

APS has developed an extensive set of work policies and complementary training programs designed to minimize the likelihood field work will be the source of ignition and provide for safe and appropriate response such as the Wildfire CPR developed by APS. This training incorporates principles and concepts drawn from various federal, state and local protocols, and standards addressing wildland fire prevention and suppression.

SUGGESTED FIRE PREVENTION TRAINING TOPICS		
TRAINING SUBJECT	**DESCRIPTION**	**INFORMATION INCLUDED IN COURSE**
Wildland Fire Prevention and Awareness	General awareness of dangers and consequences of wildland fires and general requirements for working in those areas.	**Course 1:** Wildland Fire Prevention and Awareness
Employee Requirements for Entering Forested Areas	National Forest Service and APS requirements for working in forested areas.	**Course 2:** Wildland Operating Guidelines During Fire Restrictions
Safety and Fire Equipment and its Use	Firefighting and prevention equipment required on vehicles, hands-on demonstration and training.	**Course 2:** Wildland Operating Guidelines During Fire Restrictions
Elevated Fire Conditions and Operating Guidelines	Forest Service and APS guidelines for operations during elevated fire danger.	**Course 2:** Wildland Operating Guidelines During Fire Restrictions
Line Patrol	To identify, document and correct emergency conditions and non-emergency concerns.	**Course 3:** Hazardous Vegetation Recognition During Line Inspections
Notification Process	Communication both internally and externally to report document and track issues.	In all five courses
Recognizing Fire Hazards	Vegetation and equipment issues that pose potential hazards and how to address them.	**Course 1:** Wildland Fire Prevention and Awareness **Course 3:** Hazardous Vegetation Recognition During Line Inspections
Response to Fires (Escape Plan, Safety Zones)	Fires safety and planning, including location awareness, escape planning, equipment needed, communication and personal protective equipment (PPE).	**Course 4:** Working In A Wildland Area During A Fire
APS Vegetation Management Manual	Procedures and guidelines for vegetation control and clearance of electric lines.	Not Training
Tail Board or Pre-Job Brief	Formalize fire prevention in the current form. Discuss actions of that day prior to work beginning and what precautionary measures to take.	Not Training
Personal Protective Equipment	Safety equipment needed for employees working in fire risk areas.	**Course 2:** Wildland Operating Guidelines During Fire Restrictions

Figure 9. Fire Mitigation training topics

The APS Wildfire Preparedness Levels describe the conditions under which the threat of fire is increased, and the field practices and resources which will be implemented as conditions increase. These changes affect work rules and equipment under each preparedness level. Training in the Incident Command System protocols and responsibilities are a key element of training. This system provides a structure for disciplined communications and decision-making during fire incidents. This training is completed through in-person classes, online training, national certified courses, and safety stand-downs throughout the year.

10.5.2. Fire mitigation forum and seasonal preparation meetings

Each year, the APS Fire Mitigation team conducts an annual forum to discuss, collaborate and share the latest mitigation efforts and season outlooks throughout Transmission, Distribution and Communications. The forum is used to bring together internal stakeholders to discuss improvement, as well as share successes from the past year regarding fire mitigation efforts. In addition to the annual forum, seasonal preparation meetings begin early in the year with anticipation of elevated fire conditions and to drive preparation and mitigation measures.

10.5.3. APS crews and contractors requirements

Per the APS Comprehensive Fire Mitigation Plan and associated fire mitigation procedures, all employees and contract crews shall meet the expectations during elevated fire conditions for safe operations. When the current and expected fire weather conditions warrant elevating the district preparedness levels to preparedness level 4 or 5, all work is evaluated and prioritized based on pre-emergent and emergent only.

Red Flag – In the event of Red Flag conditions, the APS Fire Mitigation Meteorologist will notify T&D as soon as possible after issuance for the APS Operational Districts affected. All mitigation measures associated with the Red Flag Standing Order will be taken along with efforts to curtail non-essential work. This information is available in the APS Fire Dashboard and supplied via email to leadership.

APS crews and contractors shall designate a fire guard during Preparedness Levels 3 and higher and during Red Flag conditions. The fire guard is responsible for executing and carrying out the Field Work Restrictions (Industrial Fire Plan requirements). The fire guard shall make daily inspections to ensure the Industrial Fire Plan requirements are met.

Fire guard – is in place to prevent, detect and suppress incipient phase wildfires (if safe to do so) and shall provide one or more persons at each job location where internal combustion engines and/or power-driven equipment are used. Each fire guard is required to read, understand and perform the Preparedness Level Field Work Restrictions (Industrial Fire Plan duties) listed above. The fire guard may perform other contract work in conjunction with fire guard duties, provided such other work does not distract from fire guard responsibilities.

Communications – APS crews and contractors shall provide some form of prompt and reliable direct communication, such as a cell phone or two-way radio, between the fire guard(s) and the work crews, and between the crew's operations and APS Supervisor. In an emergency, activate the emergency system by calling 911 and the APS project lead, as an additional resource, a list of the Publicly Managed Land Dispatch numbers has been provided in the contacts page at the end of the CFMP.

Check-in/Check-Out – All crews working in Publicly Managed Lands (PML) during preparedness levels 4 and 5 must check in with APS project lead and provide GPS location each morning before starting work.

10.6. Federal, State, and Tribal lands during restrictions and closures

During elevated fire conditions, fire restrictions and closures may be enacted on agency lands. These are determined by state and federal fire management officers and land managers during evaluation of weather conditions, fuels measurements and historic fire data among others. This is outlined in the Southwest Interagency Fire Restrictions and Closure Operating Plan. The intent of these guidelines is to facilitate interagency collaboration during the implementation of fire restrictions, closures and/or rescissions and provide consistent coordinated fire restriction messaging to the public. The guidelines also provide direction for southwest area agency’s administrators, tribal leaders and fire staff to develop and implement fire restrictions and closures.

The impact this has on utility work can vary by the level of restrictions and industrial plan designation as outlined in the state and federal guidelines. During restrictions and/or closures, the APS Fire Mitigation team (FMT) coordinates with the land managers to implement and review the current restrictions. APS FMT participates in weekly Fire Restriction Zone calls (Northern, Central-West, Southeastern, and White Mountain) to ensure the current APS District Preparedness Level is meeting or exceeding the agency guidelines during elevated fire conditions. The APS CFMP is evaluated annually by Land Managers and exemptions are determined based on mitigation measures outlined in the APS CFMP.

11. Grid design and system hardening

APS's ability to serve its current customers safely, reliably and efficiently while meeting the needs of a growing population is essential to our future success. As Arizona grows, APS will continue to construct, expand and improve grid technology to power this growth.

APS serves the sixth largest service territory in the United States, including Maricopa County, the fourth most populous county in the country with 4.3 million residents. In 2017, according to the Census Bureau, more people moved to Maricopa County than any other county in the U.S., which presents both a challenge and an opportunity for energy companies who serve this fast-growing population.

To meet this challenge, energy companies must be agile while balancing the need for long-term planning to serve growing energy needs. At APS, we consider ourselves the literal power behind this growth as we actively engage in securing new economic development projects, supply reliable and low-cost energy, construct dependable infrastructure (including smart-grid technology), and develop cutting edge renewable energy projects to meet customer demand and system needs.

In addition to these projects, APS has improved processes to ensure we are performing effectively and efficiently for our growing customer base. This includes adding training rigor for our project managers, equipping our workforce to manage the increasing number of projects and proactively working with developers and home builders to improve the time and effort required to energize their developments.

11.1. Grid Visualization & Automation

Over the past century, utilities have largely relied on a uniquely skilled workforce to maintain a safe, reliable grid. Operators and linemen/journeyman take years to develop, and the talent pool can be challenging to keep filled. Additionally, the utility industry is experiencing rapid changes in customer technology and behaviors, increased intensity and impacts of climate change and increasing costs of aged assets and system upgrades. With all this in mind, utilities must continue to use their resources wisely by leveraging the right technology and data to drive operations and planning decisions. APS is working to arm the grid with the proper visualization and automation that will meet the needs of modern-day `challenges.

Innovative capabilities can be facilitated by advanced grid technology (AGT), also known as smart grid technology, which allows devices to communicate and operate, both remotely and independently. We leverage this technology in two main ways: 1) by adopting an Area

Deployment model aiming to deploy reliability, power quality and communication technologies in the same geographic areas to implement a high degree of interoperability and efficient use of our resources. 2) through Fire Mitigation deployments that are driven by device coordination studies for segmenting and sectionalizing feeders in areas of increased fire risk; this also uses reliability and communication technologies to achieve risk management objectives.

Communication infrastructure is necessary for the field devices to communicate back to the operations center and the operations system. The AGT or smart grid tech is what executes the steps to dynamically manage the power delivery. The managing powerhouse of these operations is our advanced distribution management system (ADMS), which provides visibility to the status of the devices and gives our operators the ability to monitor and control them. AGT devices are equipped with supervisory control & data acquisition (SCADA) that provides visualization capability.

Additionally, this same mix of technology can enable distribution automation (DA). Distribution Automation is a term used to describe a strategy to enhance our operations of the distribution system to meet the needs of the modern age. DA facilitates the automated control of distribution field devices, such as capacitor banks and reclosers, with no operator input required. Two key applications in ADMS's DA toolbox are Fault Location, Isolation and Supply Restoration (FLISR), and Fire Mitigation (FM).

With FLISR technology, there is less frequency of outages, the outages seen will be shorter and they will impact less customers. The protective properties also extend the life of our conductors and assets. Automation also means fewer manual touchpoints and field responses for operators, therefore saving time and money.

With FM, we can detect operations for risk mitigation based on as-operated state, visualize areas within the ADMS view in accordance with weather and vegetation conditions, prevent powerline-initiated fires, and dynamically return to normal state as fire risk reduces. This application can empower our operators and system to directly reduce wildfire risk, keep communities safe and maintain reliability in areas that tend to by disproportionately impacted based on the geographic landscape.

The main objective in implementing these applications is to get all distribution operators working from one single control system versus multiple control systems, or what we call a single-pane-of-glass. This move reduces safety risks while increasing speed of operations. The FLISR and FM combination informs operations with greater accuracy and with greater response time to execute controls, while also minimizing unnecessary dispatch of field staff. This keeps the system resilient while allowing the skilled labor on areas of greater need, empowering APS to meet the evolving needs of grid management in the modern world.

11.2. Advanced protection

The APS System Health and Standards organizations work closely with Transmission, Distribution & Customers and APS contractors to ensure the best possible choice of technology, design and installation of equipment, hardware, and software. These standards are to ensure the prevention and mitigation of fire threats to our system or from our system. This consists of outage reviews and incident cause analysis to implement best management practices.

APS's grid modernization strategy is a key component of the Comprehensive Fire Mitigation Plan and is focused on proactively meeting the evolving energy needs of our customers in a safe, reliable and cost-efficient manner.

The electrical grid is a complex and dynamic machine that requires precision. At any given time, the output of electricity on the grid must match the exact customer demand to maintain power quality. Electricity is one of the only resources requiring this unique precision to manage supply and demand.

A traditional distribution system features a one-way power flow from the generation source to customers. However, with access to distributed energy resources (DERs), customers can now generate electricity, causing reverse power flow on the grid and increased voltage irregularities or power quality disturbances. Preserving the power quality and reliability our customers have come to expect, while still integrating new customer technology, demands real-time system feedback and the ability to respond quickly to power quality disturbances.

Through the deployment of advanced grid technologies (AGT) like automatic switches, two-way communicating devices, integrated frequency control systems, and advanced line sensors, APS is improving grid reliability and giving our engineering, operations and maintenance personnel the ability to view real-time information and exert remote control. This increase in situational awareness and remote operations allows for safe operations. APS is currently installing AGT infrastructure where all devices are connected back to APS's data centers using a variety of communication mechanisms including fiber, advanced metering infrastructure (AMI) and other wireless technologies to increase public safety during wildfire events.

APS utilizes a variety of advanced grid solutions to create a more nimble and agile system. Expulsion Limiting Fuses (ELF), communicating protective devices and line circuit breakers are examples of protective equipment used in our system. During elevated fire conditions, it is important to take steps to mitigate fire ignitions by removing automatic reclosing on line circuit breakers while maintaining electrical protection. APS selectively reduces the number of customers or critical loads impacted by a trip event for faults in the system.

To these ends, APS is performing ongoing engineering studies, which fall within two main categories:

1. Achieve adequate upstream and downstream coordination of protective devices such as fuses, pad-mount gear, line circuit breakers, and substation relays for timing and loading coordination.

2. Strategically deploy protective devices to improve protection while achieving coordination. This includes:

- For overhead line sections upstream of transitions to underground, install line circuit breakers at overhead locations.
- The company improves operational flexibility, supporting our customer restoration and minimizing fire risk.
- Add protective devices for taps off the main backbone of the system, with consideration of loading levels, fault magnitude, coordination.

- Protect critical loads such as hospitals and data centers to minimize the exposure of an outage for faults downstream..
- Increase operation flexibility and enhance the customer experience by improving and/or creating ties between adjacent feeders.

11.3. Planned additions, removals and upgrade of utility equipment

APS programmatically conducts Feeder Coordination studies on each high fire risk distribution feeder to evaluate current protection schemes against fault events. Recommended improvements to protective schemes include an additional security measure of inhibiting reclosing during elevated fire conditions while also minimizing customer outage footprint.

Feeder coordination study recommendations could include, but are not limited to:

- Upgrades to existing device protective settings
- Upgrades to existing reclosing devices
  - Replacing existing oil-filled devices with vacuum operated devices, reducing the potential of system to ground ignition.
  - Upgrading existing vacuum operated devices with upgraded technology that provides increased protection and coordination under fault conditions
- New recloser device locations
  - Installation of new recloser to eliminate a protection or coordination risk; or, increase segmentation benefits under a fault event.
- Upgrades to existing expulsion fusing at feeder laterals and OH/UG transitions
- Removal of existing expulsion type OH fusing and replacement with non-expulsion/expulsion limiting fusing

Finalized study recommendations are added to the FM Program workplan for planning and execution either the same calendar year of study finalization or the following calendar year.

11.4. NRS (No-Reclose Strategy)

System faults can be temporary in nature such as wire slapping together or a tree branch tapping a line. Other faults are sustained such as wire on the ground or a tarp in the line. During normal system operation, some protection devices (i.e., feeder breakers, reclosers, trip savers) reclose shortly after an outage attempting to re-energize customers. This reclosing mechanism helps improve the SAIFI/SAIDI and other reliability metrics.

This reclose mechanism essentially tests if the fault was temporary or sustained, also referred to as a “bolted fault.” If the fault is bolted, the line will trip out of service again. If the fault is temporary, the protection device will reclose after seconds re-energizing the line and restore power to the affected customers.

During high fire risk periods (i.e., P3 or higher), reclosing is disabled on protective devices to prevent the testing of a line until a line patrol (visual inspection) can be completed to ensure there are no wires on the ground or other visual indication that energizing the line won’t cause sparking and therefore, a fire.

This no-reclose strategy is defined in TD-DO-PRD-A035: Operations Preparation and Response to Elevated Fire Conditions. This procedure also includes conditions that must be satisfied prior to testing or re-energizing high fire risk lines/feeders.

11.5. Distribution communications reliability improvements

Grid modernization is being largely driven at the distribution level by utilizing smart grid or advanced grid technology (AGT) fitted with Supervisory Control and Data Acquisition (SCADA) capabilities to enable improved visualization, control and automation. While the devices have smart capabilities, leveraging them requires a communication path back to the operations center and the advanced distribution management system (ADMS). These devices constantly send and receive large amounts of data, so ADMS depends on reliable and secure communication network infrastructure. The increasing importance of monitoring and issuing supervisory control of our grid comes with more demanding and stringent requirements for network connectivity between our ADMS and our AGT field devices. For real-time monitoring, supervisory control and automation to work efficiently and effectively, APS must invest in a modern Field Area Network (FAN) and Wide Area Network (WAN) for end-to-end communication.

The 900MHz FAN project (IP MAS) is a secure point to multi-point network that provides over the air communication from a master radio to the remote radios installed with the AGT controllers. The project began in 2020 with deployments in the metro region. Considerations for selecting site locations each year include WAN project schedule, AGT Area Deployments and Fire Mitigation goals. Around 65 master radios have been deployed from 2020 to 2023, with primary coverage in metro with some expansion into state regions. The scope typically consists of 15-20 sites per year.

WAN expansion creates a path between data centers and substations, transporting IP networks across the organization. APS currently relies on two networks, PowerWAN and TDM, both are outdated and ready for replacement. The WAN project (NGN Program) will converge those two networks, creating a single pathway.

The project began in 2020 with a 10-year forecast for completion. As of 2023, the program is roughly a third of the way finished. The full program scope consists of 22 rings (network elements) and is completed in three phases: Hardware replacement, IP service cutover and TDM service cutover.

The 900 MHz FAN project can be and is deployed outside of WAN schedule, but the radios will not report back to ADMS until phase two of NGN is completed. The estimated completion is 2031, with phase one completed in 2029. Locations for expansion have mainly prioritized AGT area deployments in the past, whereas it now is incorporating more of the state region areas considered to have higher fire risk. The AGT team provides the IT Communications team with forecasted areas so it will expand to any area where smart grid technology is being deployed in mass. Scope will continue to be around 15-20 sites per year.

11.6. Distribution overhead system hardening

As discussed previously, the APS fire mitigation strategy consists of three core areas: Prevention, Mitigation and Response. System hardening is the implementation of technologies to help prevent and mitigate the effect of fires on the distribution system. To support this effort, the APS T&D Engineering and Standards (TDES) group is reviewing and evaluating technologies with the proven ability to prevent sources of ignition along utility corridors and minimize the impact of fire on the system.

This effort consists of a two-pronged approach:

1. TDES reviews System to Ground (STG) events with APS Fire Mitigation and supporting groups. Through this process, APS can identify potential distribution asset classes that warrant further review for system hardening.

As a result of these efforts, the following technologies are being actively evaluated or implemented:

11.6.1. Steel Poles

Steel poles are recommended as a standard construction for areas at risk of fires. They will help reduce the potential spread of a fire while providing some resistance against fast moving grass fires. While currently being a standard pole material used for construction, historically, their use has been limited to urban areas accessible by vehicles due to challenges associated with pole climbing for maintenance.

11.6.2. Wood Pole Wrap

Protecting existing and new wood poles against fire impact. For this application, a wood pole wrap has been approved and introduced as a tool to protect wood poles against ignition.

This pole wrap is a galvanized steel mesh which is impregnated with an intumescent carbon coating. When the coating is exposed to heat, it expands, filling the voids in the mesh and creating an insulating barrier. The mesh is completely wrapped around wood poles from slightly below grade up to a specified height, depending on the prevalent fuels and fire conditions in the area. Once the coating is activated and expanded, the insulating barrier it creates around the pole protects the pole from further exposure to heat, embers and hot particles.

11.6.3. Fusing

Link break expulsion fuses, typically found on overhead distribution lines, use an appropriately sized fusible link housed within a fuse tube to protect equipment and facilities from surge and overload conditions. When these expulsion fuses operate, the fusible link breaks, and hot gases and particles are vented out of the fuse tube. These expulsion fuses were identified as a possible source of ignition due to their method of operation.

Various alternate fusing options are being investigated for use in high fire risk areas which significantly reduce the expulsion of hot particles during operation. They achieve this using a muffler/exhaust system which traps and contains the hot particles, or through the use of different

materials to rapidly quench the arc generated during operation. These fusing options can be used to protect overhead transformers, transitions and feeder laterals. Once validated and approved, they will be introduced with construction standards for use in high fire risk areas.

11.6.4. Surge Arresters

Overhead surge arresters are used to protect overhead equipment, distribution lines and facilities. Under normal conditions, they offer a high impedance path to ground. However, during surge current conditions, they allow a low impedance path to ground to shunt the surge away and protect nearby facilities. Under significant overload events, or as they approach end of life, the surge arrester may shed hot particles when the ground lead disconnector operates or if the internal metal oxide varistor (MOV) block fails. This was identified as another potential source of ignition and alternative solutions are being investigated.

To address this, a surge arrester designed for use in high fire risk areas is being pursued as a suitable alternative to APS' standard construction. These arresters utilize a fully contained disconnector between the ground lead and the arrester body itself. This disconnector is designed to safely disconnect the ground lead without shedding sparks and to prevent the MOV block from failing catastrophically under significant surge events. Once this surge arrester is validated and approved, it will be introduced with construction standards for application in high fire risk areas.

11.6.5. Wildlife Guards

Bird guards and wildlife protection devices are used to reduce the risk of wildlife contacting nearby surfaces of different voltage potentials. If contact is made, a fault would occur – leading to potential outages, damage to equipment, animal fatalities, and system to ground ignitions. The APS Avian and Wildlife Protection program provides industry standards companywide on understanding and mitigating the risk protentional for these incidents. Bird guard covers and devices are used on transmission and distribution lines, as well as inside of substations. Some examples of these would be phase covers, vice top covers, wildlife discs, arrestor and bushing covers, flight diverters and anti-perch caps. Some of these protective covers have also shown success in minimizing incidents due to vegetation or mylar balloons.

The Avian and Wildlife Protection program also installs nesting platforms on APS poles to encourage nesting birds to build on these rather than on our equipment. These platforms reduce the chances of avian caused fires and outages caused by nesting substrate reaching into our equipment and going phase to phase. Another avian mitigation tool is the installation of avian perches. The perches allow for birds to safely sit above APS equipment without risk to the above-mentioned issues.

APS recommends continuing to adopt the use of wildlife protection on transmission, distribution and substation facilities and to seek out wildlife protection solutions for hardware that currently does not have an approved wildlife guard. To support this, wildlife guards from various manufacturers are being evaluated and tested on different accessories by APS Standards and Engineering and members of APS System Health. Through this work, APS will continue to grow this program and further decrease the chances of avian caused outages and system to ground fires.

11.6.6. Covered conductor

In the same vein as wildlife guards, a jacketed conductor, also known as tree wire, can be used for overhead distribution facilities to help minimize the risk of wildlife, vegetation and foreign object contact between lines. However, this jacketed conductor poses new challenges in constructability and maintainability due to different tooling and hardware needs as well as work practices. Both de-energized and energized evaluations are being conducted by APS from a performance, constructability and maintainability standpoint.

11.7. Pole replacement and reinforcement

APS has wood pole infrastructure throughout the wildland urban interface. The purpose of the Wood Pole Replacement program is to foster and improve system reliability through regular inspections and maintenance, including total replacement of the wood poles. Failures of these poles can interrupt service to customers, present a public safety hazard and result in costly emergency repairs. In recognition of these risks, Section 6 of the National Electric Safety Code requires utilities to regularly inspect and maintain the poles in their system.

Wood pole inspections are required to ensure the integrity of the pole structure and enhance system reliability. The National Electric Safety Code requires that utilities replace structures in which the strength has declined below 66% of the original design value. APS uses 70% of the original design strength for its replacement criteria. Wood poles are inspected for deterioration due to rot, decay or insect damage. In addition, wood poles are tested for remaining strength.

11.8. Microgrids

Microgrids can be deployed on the distribution system to improve reliability for our customers. These systems typically have the capability to serve as an alternate generation source for our customers during system outages, and often use generators or batteries as a power source.

During Elevated Fire Risk conditions, the No Reclose Strategy and patrol strategies that we implement can lead to extended restoration times for our customers. Microgrids have the potential to reduce the impact of extended restoration times.

11.9. Transmission tower maintenance and replacement

This entails a structure-by-structure inspection of all transmission lines, assessing and repairing each structure as needed. Identified remediations may include insulator replacements, structural component replacements and hardware tightening. Each structure’s inspection is on a seven-year cycle utilizing a comprehensive aerial inspection or a climbing inspection process. Tower management maintenance work is prioritized, and completion dates are tracked in Maximo.

12. Asset management

12.1. Geographic information system data

A geographic information system (GIS) is a system that creates, manages, analyzes, and maps all types of data with a spatial context. GIS connects data to a map, integrating location data (where assets are) with all types of descriptive information (what things are like there). This provides a

foundation for mapping and analysis that is used across many areas of the utility's operations. GIS helps users understand patterns, relationships and geographic context. The benefits include improved communication and efficiency as well as better management and decision making.

The GIS Services team are the Owners and Stewards of the enterprise GIS database, which contains all assets of the electric and communications infrastructure. As a System of Record, we digitize, process and QA/QC the data found in the designs and drawings of various work packages. As a System of Engagement, we publish and integrate our data into tools that allow scaling and distribution of the inherent power of maps and data to the enterprise, therefore improving collaboration, information and decision making. As the System of Insight, the GIS Services team supports and empowers internal and external customers with data, map and app solutions that assist APS with achieving business objectives.

The GIS Services team maintains the system of record through published department processes that capture the key steps in digitizing the electric assets, for which the IT Communications department have their own department procedures. TD-EG-PRC-4003 outlines the #2 Work Order Construction Mapping process intended to walk a user through the life cycle of a work order issued for construction, from initial routing until mapping of the designed state that was Issued for Construction (IFC). Once facilities are constructed in the field, crew foreman provide a redlined design to capture as-built state of the facilities that the GIS Department captures through the As-built Mapping process, TD-TC-PRD-1006.

Beyond the system of record, APS subscribes to the use of a variety of ESRI ArcGIS tools for empowering the organization. Some of these tools are ArcGIS Online and ArcGIS Enterprise for web content and collaboration. These distributed web environments allow end-user departments to create and manage their own geographic content and workflows while also leveraging internal and external data sources made available through web map and feature services. These workflows may also be extended through field apps such as Field Maps, Survey123 and Quick Capture to enhance operational capabilities supporting critical activities like vegetation management, fire tracking, risk analysis, and more.

12.2. Tracking and analysis of STG/GTS

The tracking and analysis of system to ground (STG) ignitions and impacts from ground to system (GTS) fires remains a priority in assessing fire risk to the APS system. The mitigation of STG ignitions is an ongoing process through vegetation management, Defensible Space Around Poles (DSAP) program, the hazard tree program, routine line maintenance, right of way management, and upgrades to APS devices and system each year. Currently, the Fire Mitigation team (FMT) collects data and tracks all STGs from the beginning to end of year. The Advanced Distribution Management System (ADMS) from distribution operations center (DOC) provides a tool for the FMT to find detailed information directly from crews on outages or incidents requiring an APS response. From this information, a report with pictures is created and sent to the System Health and Standards Department to discuss potential solutions and improvements.

As APS's infrastructure has potential to cause STG fires, GTS fires that have the potential to affect the system are tracked and anticipated to mitigate impacts. With the purpose of tracking any wildland fire, the APS Wildfire Awareness Dashboard visualizes and tracks potential

impacts of wildland fires, including prescribed burns. In cooperation with city, state and regional dispatch centers, the FMT receives notifications sent through text message on any initial reports of a fire or burn in the state of Arizona. From this information and other tools, the FMT internally maps and monitors active fires for potential impact to APS' system. Direct communication with DOC, FMT and fire resources is necessary to gather real-time information for better determination of the risk involved. The impact related to APS's infrastructure includes but is not limited to outages or de-energization, tripped lines due to fire impacts, damaged devices or poles, and risk of injuries to firefighters or APS crews. The impacts are then documented, tracked and analyzed for better improvements to reduce the impact of wildland fire on APS.

12.3. Pre Elevated Fire Conditions Line Patrols

The Elevated Fire Conditions Line Patrol guidance is documented in the Electrical Facilities Inspections and Corrections procedure, TD-SH-PRD-2001. Inspections are performed annually with anomalies identified, documented and prioritized within Maximo. EFC patrols determine potential issues that need to be corrected on sections of high-risk circuits with elevated risk of fire. Patrols include identifying combustible materials or vegetation that must be removed and equipment/material anomalies that could create a spark.

During the pre-elevated fire conditions line inspections, poles that have reached the end of their lives and are identified and scheduled to be replaced. These poles are reviewed annually prior to fire season to look for large cracking, checking for damage that could degrade the life of the pole during a high wind or direct fire impact, and could cause the conductor being held up by the pole to fall or break. This replacement due to visual inspection within the wildland urban interface is in addition to the invasive pole testing program that occurs on a regular cadence based on utility best practices. These poles are replaced with new sturdier wood poles or steel poles if the line is accessible by a truck. This program helps to maintain the integrity of the line in the event of its proximity to a fire, which results in quicker restoration time to our customers and a safer environment for on-the-ground firefighting.

13. Vegetation management and inspections

13.1. Detailed inspections of vegetation around distribution

Pre-inspection line patrols for distribution are completed on a two-to-six-year cycle. These cycles consider the growth rates, locations, fire risk, and Occupational Safety and Health Administration (OSHA) compliance thresholds to meet cycle objectives. Pre-inspectors identify, document and notify owners to have work assigned and completed within the routine schedule. Vegetation will either be identified as needing pruning, removal or needing herbicide treatment to maintain right of way (ROW) reliability. Designation depends on ownerships desires, species, location, feasibility, or other determining factors that would necessitate maintenance. Work is documented in the Mobile Vegetation Management application (MVM) to be recorded, and then disseminated to the contractor for completion.

13.2. Detailed inspections of vegetation around transmission

Pre-inspection line patrols for transmission are completed on a one-to-five-year cycle. These cycles consider the growth rates, locations, fire risk, Occupational Safety and Health Administration (OSHA) compliance, and forestry action thresholds to meet cycle objectives. Pre-inspectors identify, document and notify owners to have work assigned and completed within the routine schedule. Vegetation will either be identified as needing pruning, removal or needing herbicide treatment. Designation depends on ownership, ownerships desires, species, location, feasibility, or other determining factors that would necessitate maintenance. Work is documented in the Mobile Vegetation Management application (MVM) to be recorded, and then disseminated to the contractor for completion.

13.3. Emergency response vegetation management

Upon receipt of a call out for emergency response for emergent tree work during a storm or outage event, the planner will create a Non-Routine Mobile Vegetation Management profile and communicate the work to the contractor. The work's purpose is to obtain sufficient clearance for safety and power to be restored to stakeholders as soon as possible. In the event the wire is not down, work will be performed, as necessary. If a contractor arrives on-site to perform emergency work and discovers there is an electric service line broken, they are prohibited from performing any tree work until the line is grounded by an Electric Serviceman. The contractor should report the situation to their general foreman (GF) upon discovery and remain on-site, at a safe distance, to guard the site from passers-by.

In adverse conditions, advance stakeholder notification of pruning or removal is not required, however, it may be necessary to contact the stakeholder if the contractor needs access to the property through a locked gate or to have pets moved to safety and out of the work zone. After work completion, photo documentation is attached to MVM non routine profile and sent to the planners.

13.4. Fuels management

It is preferable in many situations to remove small or immature vegetation rather than to obtain line-clearance by pruning. This type of vegetation has the potential to reach electrical supply lines and should be removed while still in this state. Vegetation growing directly beneath or adjacent to electrical supply lines, diseased, dead, or dying trees that are leaning towards electrical supply lines or otherwise present a hazard to the electrical supply lines should be removed to eliminate the potential for contact.

13.5. LiDAR inspections of vegetation around distribution infrastructure

In addition to the routine inspection flights, APS conducts flights for gathering aerial photography and Light Detection and Ranging (LiDAR) data along some distribution electrical supply lines. LiDAR collects valuable information regarding the vegetation along and adjacent to the power line right of ways (ROW). It provides precise data on power line structures and locations, models topography using elevation contours and identifies vegetation encroachment. The data is evaluated in person, using quality control inspections for planning, identifying and prioritizing vegetation and line maintenance work.

13.6. LiDAR inspections for vegetation around transmission infrastructure

In addition to the routine inspection flights, APS conducts flights for gathering aerial photography and Light Detection and Ranging (LiDAR) data along the transmission supply lines. LiDAR collects valuable information regarding the vegetation along and adjacent to the power line right of ways (ROW). It provides precise data on power line structures and locations, models topography using elevation contours and identifies vegetation encroachment. The data is evaluated and ground verified and used for planning, identifying and prioritizing vegetation and line maintenance work.

13.7. Patrol inspections of vegetation around distribution infrastructure

Pre-inspection line patrols for distribution infrastructure should identify vegetation to be pruned back to provide clear access to the facilities. A 10’ wide radius cylinder of vegetation should be cleared from any pole with equipment to prevent wildfire spread if an electrical spark is discharged from the facilities. Vines growing in areas around and on poles and guy wires should be cut at the ground and treated with herbicide, if approved. Any vine remaining on the pole should be severed and removed from the basal cut to at least twenty feet above the ground or the lowest wire on the pole ensuring a person could not touch the remaining vine. Do not attempt to pull on the remaining vine to dislodge it from the hardware as this may cause a fault. Work is documented in the Mobile Vegetation Management application (MVM) to be recorded, and then disseminated to the contractor for completion.

13.8. Patrol inspections of vegetation around transmission infrastructure

Pre-inspection line patrols for transmission infrastructure should identify vegetation to be pruned or removed entirely. Designation depends on ownership’s desires, species, location, feasibility, or other determining factors that would necessitate maintenance. Work is documented in the Mobile Vegetation Management application (MVM) to be recorded, and then disseminated to the contractor for completion.

13.9. Hazard tree removal

Line miles intersecting a fire risk index rating of 3.5 or higher within conifer vegetation types, excluding Pinon-Juniper woodlands, pose the greatest risk to APS facilities. Hazard vegetation by APS definition is a tree, vegetation or portion of tree or vegetation (e.g., limb) that could contact a power line, structure or equipment and cause electrical fault. Vegetation can be considered hazardous if it exhibits a structural defect that increases the chances of it failing and contacting electric utility infrastructure. Healthy vegetation may also be considered a hazard if it has encroached close enough to an electric power line and could result in electrical fault or exhibit such defect that can pose a risk to striking the overhead lines.

Hazard vegetation can be categorized as an Emergent Hazard or Off-Cycle Hazard (see definitions below).

- Emergency hazard - A tree that has failed and/or has caused an outage.
- Emergent hazard - Requires work in less than 48 hours but has not yet caused an outage.

- Off-Cycle hazards - Requires off-cycle attention and can hold seven days for agency notification and possible comment.
- Maintenance work - Notification will occur as part of the standard routine agency approval processes through the Natural Resource team.

APS Forestry employees are encouraged to obtain their Tree Risk Assessment Qualifications (TRAQ) through the International Society of Arboriculture (ISA). Certified Tree Risk Assessment Qualified Arborist are solely utilized for the inspection and identification of hazard vegetation. APS utilizes both Level 1 and Level 2 Tree Risk Assessments during routine maintenance cycles and off-cycle maintenance. Areas are targeted for hazard tree mitigation through multiple considerations including recent fire activity, known insect activity from forest health data, as well as cyclical maintenance. Also, consideration of the cyclical overhead vegetation maintenance ensures lines that have not been inspected the previous year and are not scheduled for inspection the current year are included for hazard tree mitigation.

13.10. Substation inspections, vegetation management

Substation vegetation management has two components: internal (bare ground) and external (landscape maintenance).

Internal, bare ground is achieved with herbicide application annually for vegetation mitigation to create bare grounds. This shall include the entire area of the substation inside the perimeter of the furthest fence, wall or barrier. For pedestal/pole mounted substations, areas under the equipment will be cleared of any vegetation and a defensible space around the poles will be cleared up to ten feet perimeter provided land ownership consideration for coordination.

External landscape maintenance is achieved with substations being pre-inspected twice a year. The first inspection will be done within the months of January – June and the second inspection will be done within the months of July – December, documented in the Mobile Vegetation Management application. Pre-inspection of the vegetation includes identifying as needed pruning, removal and herbicide application.

13.11. Renewable Energy and Batteries, Vegetation Management

Renewable Energy and Batteries sites will be bare ground inside the perimeter of the furthest fence, wall or barrier and eight feet external to the fence, wall or barrier.

13.12. DSAP

APS Safety and Reliability Clearance Standards, including the APS Vegetation Management Manual for vegetation near power lines and/or equipment, recognized the need to remove hazardous fire fuel loading around the base of equipment poles in the Wildland Urban Interface. APS has adopted, as best management practice, the International Code Council (ICC), 2012 and the Wildland Urban Interface Code, which states a utility with a pole that has equipment attached to the pole must clear all vegetation 10’ in all directions and 10’ from the ground up. The clearing is being done using manual methods, including rakes, string trimmers and hand saws, and herbicide where approved, while maintaining adherence to all biological and cultural conservation measures.

APS has prioritized the treatment of subject poles by utilizing data derived from the risk assessment in the Wildland Urban Interface, and in the state's highest-risk areas.

The objective of the cycle is based on growth rate and species allowing for a two-year cycle. Trees and ground vegetation will be pruned in accordance with proper arboricultural techniques for pruning near power lines and at the base of the pole as outlined in American National Standards Institute (ANSI A300) pruning standards.

Each customer is contacted by a combination of a postcard and pre-inspector, and the abatement is performed by a crew. A job profile is generated for each pole and the work is completed per the profile. The work profile and work site are then audited for quality control following work completion. Scheduling the abatement is driven by the risk to values in the communities we serve.

13.13. Integrated vegetation management (IVM)

The APS Vegetation Management program is based on Integrated Vegetation Management (IVM). This vegetation management methodology is a system of managing plant communities by identifying compatible and incompatible vegetation and evaluating, selecting and implementing the most appropriate control methods to ensure the safe, reliable delivery of electricity to customers, meeting APS's established objectives. IVM approach/methodology is consistent with Part 7 of the American National Standards Institute (ANSI) A300 standards and is an integral part of the Comprehensive Fire Mitigation Plan. This includes, but is not limited to the following areas of IVM elements:

Set Objectives – such as promoting safety, preventing sustained outages caused by vegetation growing into electric facilities, maintaining regulatory compliance, protecting structures, and security.

Evaluate the Site – inspection of right of ways (ROW) before, during and after vegetation management work to identify and target incompatible vegetation that poses a risk or identifies a situation that would not be consistent with the APS set of objectives.

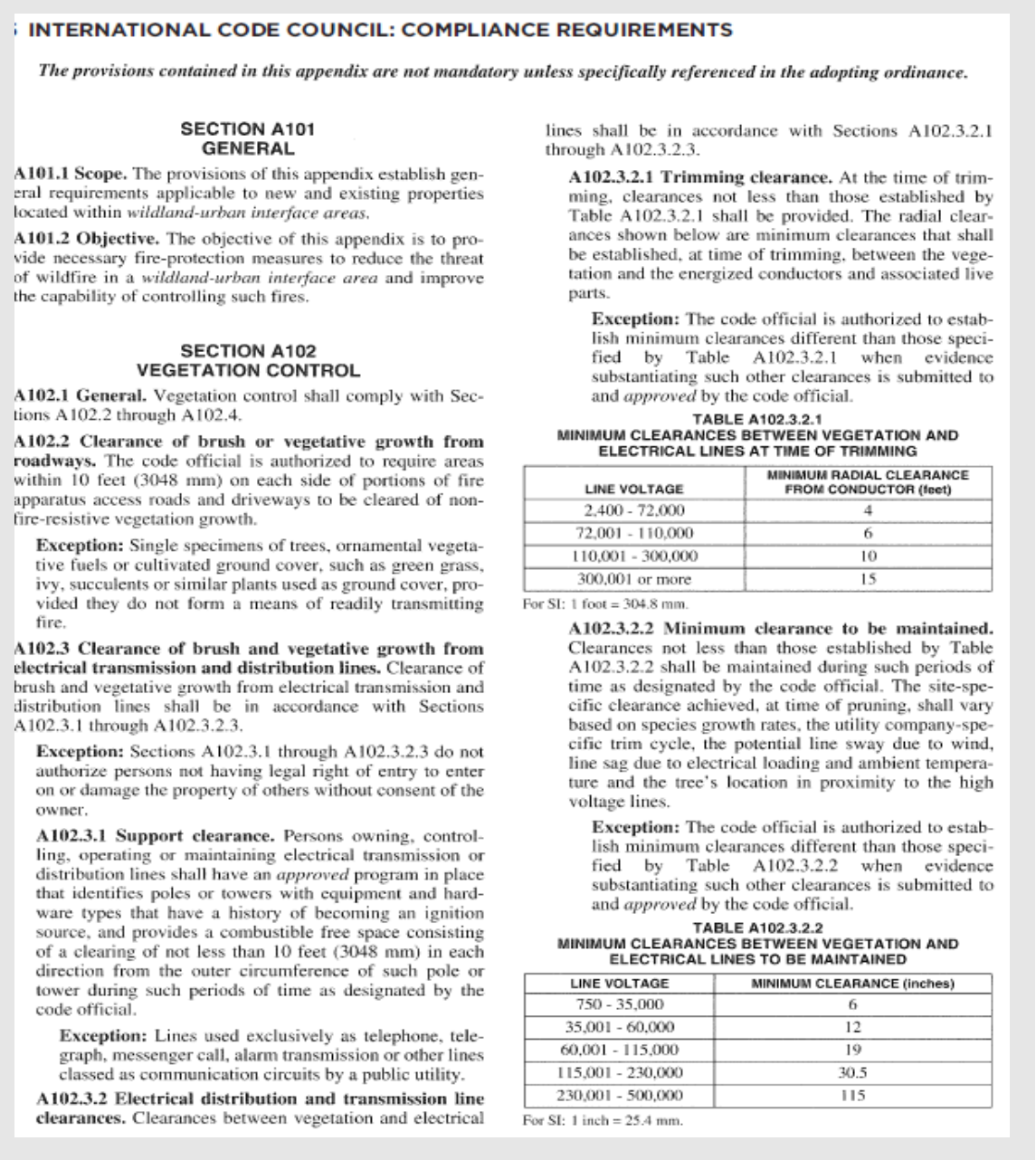
Define Action Thresholds – level at which the method of control would be initiated.

Evaluate and Select Control Methods – selecting the most appropriate vegetation control methods including manual, mechanical and chemical techniques.

Implement IVM – removing and pruning incompatible vegetation under and around utility lines and infrastructure through careful, targeted manual and mechanical treatments.

Monitor Treatment and Quality Assurance – post-work monitoring of treatment effectiveness and quality. The ROWs are inspected annually to plan, prioritize and conduct utility vegetation management work, in compliance with FERC reliability standard (FAC 003-4).

13.14. International code council compliance for utility vegetation maintenance



INTERNATIONAL CODE COUNCIL: COMPLIANCE REQUIREMENTS

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

SECTION A101
GENERAL

A101.1 Scope. The provisions of this appendix establish general requirements applicable to new and existing properties located within *wildland-urban interface areas.*

A101.2 Objective. The objective of this appendix is to provide necessary fire-protection measures to reduce the threat of wildfire in a *wildland-urban interface area* and improve the capability of controlling such fires.

SECTION A102
VEGETATION CONTROL

A102.1 General. Vegetation control shall comply with Sections A102.2 through A102.4.

A102.2 Clearance of brush or vegetative growth from roadways. The code official is authorized to require areas within 10 feet (3048 mm) on each side of portions of fire apparatus access roads and driveways to be cleared of non-fire-resistive vegetation growth.

Exception: Single specimens of trees, ornamental vegetative fuels or cultivated ground cover, such as green grass, ivy, succulents or similar plants used as ground cover, provided they do not form a means of readily transmitting fire.

A102.3 Clearance of brush and vegetative growth from electrical transmission and distribution lines. Clearance of brush and vegetative growth from electrical transmission and distribution lines shall be in accordance with Sections A102.3.1 through A102.3.2.3.

Exception: Sections A102.3.1 through A102.3.2.3 do not authorize persons not having legal right of entry to enter on or damage the property of others without consent of the owner.

A102.3.1 Support clearance. Persons owning, controlling, operating or maintaining electrical transmission or distribution lines shall have an *approved* program in place that identifies poles or towers with equipment and hardware types that have a history of becoming an ignition source, and provides a combustible free space consisting of a clearing of not less than 10 feet (3048 mm) in each direction from the outer circumference of such pole or tower during such periods of time as designated by the code official.

Exception: Lines used exclusively as telephone, telegraph, messenger call, alarm transmission or other lines classed as communication circuits by a public utility.

A102.3.2 Electrical distribution and transmission line clearances. Clearances between vegetation and electrical lines shall be in accordance with Sections A102.3.2.1 through A102.3.2.3.

A102.3.2.1 Trimming clearance. At the time of trimming, clearances not less than those established by Table A102.3.2.1 shall be provided. The radial clearances shown below are minimum clearances that shall be established, at time of trimming, between the vegetation and the energized conductors and associated live parts.

Exception: The code official is authorized to establish minimum clearances different than those specified by Table A102.3.2.1 when evidence substantiating such other clearances is submitted to and *approved* by the code official.

TABLE A102.3.2.1
MINIMUM CLEARANCES BETWEEN VEGETATION AND ELECTRICAL LINES AT TIME OF TRIMMING

LINE VOLTAGE	MINIMUM RADIAL CLEARANCE FROM CONDUCTOR (feet)
2,400 - 72,000	4
72,001 - 110,000	6
110,001 - 300,000	10
300,001 or more	15

For SI: 1 foot = 304.8 mm.

A102.3.2.2 Minimum clearance to be maintained. Clearances not less than those established by Table A102.3.2.2 shall be maintained during such periods of time as designated by the code official. The site-specific clearance achieved, at time of pruning, shall vary based on species growth rates, the utility company-specific trim cycle, the potential line sway due to wind, line sag due to electrical loading and ambient temperature and the tree's location in proximity to the high voltage lines.

Exception: The code official is authorized to establish minimum clearances different than those specified by Table A102.3.2.2 when evidence substantiating such other clearances is submitted to and *approved* by the code official.

TABLE A102.3.2.2
MINIMUM CLEARANCES BETWEEN VEGETATION AND ELECTRICAL LINES TO BE MAINTAINED

LINE VOLTAGE	MINIMUM CLEARANCE (inches)
750 - 35,000	6
35,001 - 60,000	12
60,001 - 115,000	19
115,001 - 230,000	30.5
230,001 - 500,000	115

For SI: 1 inch = 25.4 mm.

Figure 10. Excerpt from the International Code Council Wildland Urban Interface Code

APS Transmission Rights-of-Way (ROW) are inspected annually to plan, prioritize and conduct utility vegetation management work in compliance with FERC reliability standard (FAC 003-4). The ICC Code has been adopted and implemented on distribution equipment poles as a best management practice. This work is completed on subject poles in the Wildland Urban Interface (WUI) in APS service territory, as described in the Defensible Space program (DSAP), previously covered in the Comprehensive Fire Mitigation Plan. The APS DSAP currently consists of poles which contain equipment such as transformers, fuses, arrestors, switches,

regulators, capacitors and any additional equipment identified with the potential to create a spark.

13.15. Right Tree-Right Place

Strategic placement of trees and vegetation has direct benefits for home and business owners. However, areas near and around infrastructure can become a safety hazard and cause power outages if planted within close proximity. Often times there may be overhead or underground utilities within properties that can be hazardous when planting and pruning trees or shrubs. Shrubs and trees planted near overhead lines should not grow taller than 15 feet, but height should be determined by a qualified utility arborist to ensure the height is suitable for the site.

14. Stakeholder and public coordination during an incident

14.1. Emergency planning and preparedness programs

APS Fire Mitigation continually identifies the key components, resources and personnel to collaborate in an annual forum to discuss and act upon aspects associated with wildfire awareness and mitigation. Collaboration consists of energy control center (ECC), distribution operations center (DOC), Training, Operations, Engineering, Communications, and the Fire Mitigation team to build continuity, develop roles and responsibilities and define objectives in an emergent situation. The team is tasked with an annual meeting that consists of a table-top drill to test current response systems and communications to a simulated exercise. This drill is used to identify what works and what needs to be addressed within the system to ensure timely and accurate information. One of the key components is to allow personnel from areas that do not work together often but could be working side by side in an emergent situation to have some familiarity.

Summer Readiness Communication Objectives:

- Systems Health and Outage Reports
- Communicating Elevated Fire Condition Requirements
- Fire Mapping and Communications with ECC and DOC
- Conduct Annual Forum with T&D
- Participate in Summer Readiness

14.2. Emergency Management and Fire Response

Our APS commitment is to provide a resilient infrastructure to meet the needs of the community, customers and employees through an all-hazards approach focusing our efforts on mitigation, preparedness, response, and recovery. APS emergency management establishes the framework to prepare for and respond to all hazards, both natural and man-made, in the APS service area. The process is designed to be flexible and scalable to respond to any type and size of disaster. Preparedness is a strategic approach to ensuring employees are equipped to respond to emergencies that may occur in the workplace. To provide basic actionable information, our team

has put together resources each department can use to determine what information they need to respond to an emergency at one of our APS facilities.

This process incorporates the National Incident Management System (NIMS) and the Incident Command System (ICS) into the general approach toward responding to emergencies. NIMS is a system that provides a consistent nationwide approach for federal, state and local governments and private industry to work effectively and efficiently together to prepare for, respond to and recover from domestic incidents, regardless of cause, size or complexity. ICS is a standardized incident management concept designed specifically to allow responders to adopt an integrated organizational structure equal to the complexity and demands of any single incident or multiple incidents without being hindered by jurisdictional boundaries.

This process provides the guidelines necessary to coordinate Transmission and Distribution emergency management activities with APS districts, divisions and the Corporate Emergency Operations Center (CEOC).

APS participates in and is a signatory with the Western Regional Mutual Assistance Agreement. This agreement allows the signatories to share resources in the event of an emergency affecting the generation, transmission, distribution, services and/or related facilities owned or controlled by a Party to the Agreement. A “Requesting Party” may request another Party or Parties, the “Assisting Party” to provide assistance. The Assisting Party shall, in its sole discretion, determine if it shall provide such assistance, including the extent and limitations of that assistance. If the Assisting Party determines to provide assistance, such assistance shall be provided in accordance with the terms and conditions of the Western Regional Mutual Assistance Agreement.

The T&D Emergency Management program uses five preparedness Mission Areas: Prevention, Protection, Mitigation, Response, and Recovery to provide an all-hazard consequence management approach to emergencies and disasters. The mission areas represent a spectrum of activity. They are highly interdependent and there is regular coordination among departments and agencies working to prevent, protect against, mitigate, respond to, and recover from all threats and hazards including the threat of wildland fire.

Additional efforts are made in the participation of Community Wildfire Protection Plans (CWPP) and Right of Way (ROW) Annual Meetings. The Maricopa County Community Wildfire Protection Plan requires an annual meeting between APS and SRP to mutually identify locations of needed vegetative treatments within ROW in high-risk areas of the Wildland Urban Interface (WUI) and support the core team in obtaining grants and agreements necessary to implement vegetative fuel reduction projects adjacent to ROW.

14.3. Adequate and trained workforce for service restoration

Mutual assistance is an essential part of the energy industry contingency plan and restoration process. Utility and electric service companies impacted by a major outage event use mutual assistance to augment the size of their workforce by borrowing restoration workers from other utility companies. If APS requests, a utility company will send trained and qualified skilled restoration workers, along with specialized equipment, oversight management and support personnel to assist the restoration effort. APS is a member of multiple emergency associations to

facilitate mutual assistance and maintain active mutual assistance agreements with the following organizations, Western Energy Institute and Edison electric institute. The decisions to deploy and respond teams or request mutual assistance as facilitated by APS Transmission and Distribution Incident Command Center (TDICC) and determined by the consultation with key operational directors and executives.

14.4. Community outreach, public awareness, and communication efforts

A variety of measures can be taken to support information flow to customers when a wildfire incident occurs that may cause prolonged outages. Depending on the outage, some of these steps include:

- Sending automatic outage alerts through email or text message to customers
- Communicating directly with specific commercial customers
- Contacting and checking in with medically monitored customers per guidelines
- Updating the APS Outage Map with timely information
- Contacting customers with outage information through the dialer system
- Providing customers an automated phone system to report outages and receive updates

During extended outages, impacted customers will receive an additional notice that provides information about resources, along with regular updates. Customers receiving alerts will be directed to the APS Outage Map for more information.

In addition, the Fire Mitigation Communication plan helps establish APS as a trusted community partner, educate customers about our fire prevention efforts to maintain reliable serve, inform them about potentially prolonged outages ahead of a wildfire, and encourage them to take preparedness action. The APS External Communications and Public Affairs teams partner to develop and implement the following communications tactics:

- Conduct outreach to elected officials and stakeholders, present messaging to city councils, fire chiefs and agencies, and distribute outreach material.
- Deploy a seasonal bilingual campaign in English and Spanish from April to September that provides customers with timely updates and preparedness information in the form of emails, postcards, bill messages, social media, the APS website, and newsletters.
- Develop unique TV, radio and print news pitches and partner with news organizations to distribute important preparedness tips and information about APS's fire preparedness efforts and find opportunities to collaborate with leaders in Arizona's fire community.
- Produce videos and develop website and social media content to engage customers in information online.

14.5. Preparedness and planning for service restoration

Emergency Events are managed at the lowest level of the organization possible, within the scope, capabilities and resources within that level. Escalation occurs when additional resources or support is needed to assist in the management of the event. Large-scale or high-impact events are managed by the line of business in the T&D Incident Command Center (ICC). Events managed at this level utilize the incident action planning process. The "Planning P" outline provides a

consistent rhythm and structure to incident management with a set cadence for meetings and communication. In the Tactics meeting, key players review the proposed tactics developed by the Operations Section and conduct planning for resource assignments to ensure safe and timely service restoration.

14.6. After Action Reporting and Improvement

At the conclusion of the management of the emergency event, a debrief will be conducted. Additional After-Action meetings may be scheduled as well as deemed necessary by the Emergency Manager or Incident Command Center (ICC) Director. Notes will be taken during these discussions and compiled into a usable document known as the After-Action Report and Improvement Plan (AAR/IP). This document will be used for making changes to any processes, systems, plans, or procedures as identified. Each member of the ICC will keep records of the event, their participation and actions taken. The AAR/IP will be completed by the T&D Emergency Manager following any activation of the ICC.

14.7. Emergency management operations

Emergency Management operations are detailed in the T&D Emergency Operations Plan (EOP).

14.8. Stakeholder cooperation and community engagement

As part of our core values, APS is constantly striving to meet and exceed the best management practices for fire mitigation. This is maintained by following the cohesive strategy and remaining compliant with the most current fire regulatory information. APS Fire Mitigation is integrated with state and federal resources which provide accurate and timely information on current and expected regulations and compliance. This is accomplished through relationships developed with the State Fire Marshal's Office, State Land Office, State Forester's Office, and federal agencies and organizations.

The Fire Mitigation Specialists participate in the following list of organizations to ensure the participation of any conversation that will impact the business or operations of APS as related to regulatory compliance. The following list includes but is not limited to:

- National Fire Code
- Arizona State Forester WUI Council
- Ponderosa Fire Advisory Council (PFAC) (Flagstaff)
- Four Forest Restoration Initiative (4FRI)
- Prescott Area Wildland Urban Interface Commission
- Southwest Incident Management Teams
- Yavapai County Local Emergency Planning Committee
- State Emergency Management, including all (11) counties APS serves

- Arizona Fire Chiefs Association
- USFS (FMO) Situation/Fire Restriction calls

Among these organizations, APS participates closely with the National Cohesive Wildland Fire Management Strategy and Arizona Fire Adapted Communities and has adopted these approaches to the APS Fire Mitigation program from the utility perspective.

The National Strategy establishes a national vision for wildland fire management, defines three national goals, describes the wildland fire challenges, identifies opportunities to reduce wildfire risks, and establishes national priorities focused on achieving the national goals. It is a strategic push to work collaboratively among all stakeholders and across all landscapes, using best science to make meaningful progress toward the three goals. (https://www.forestsandrangelands.gov/strategy/thestrategy.shtml):

1. Resilient Landscapes
2. Fire Adapted Communities
3. Safe and Effective Wildfire Response

APS Fire Mitigation Specialists participate in the Arizona Fire Adapted Communities (AZ FAC) organization to collaborate and help share the National Strategy on a statewide level. The Arizona Fire Adapted Communities' mission is to create fire adapted communities that understand the beneficial role of fire on our landscapes, embrace responsibility for their risk and take actions to protect the social, economic and ecological values threatened by wildfire (http://azfac.org/).

The APS Fire Mitigation program has joined the International Wildfire Risk Mitigation Consortium (IWRMC) which is an international collaborative effort amongst electric utilities to identify and share best management practices. IWRMC and APS participation focuses on topics surrounding asset management, operations and protocols, risk management, vegetation management, data governance, and stakeholder engagement.

14.9. Cooperation with suppression agencies

APS strives to create and maintain relationships with all stakeholders. These relationships begin with preseason coordination and collaboration meetings that continue throughout the year. During a wildland fire incident, the Fire Mitigation team coordinates with the fire resources. This typically begins with communication to the authoritative dispatch center. Once an incident has been confirmed and has a potential impact to APS infrastructure, the Fire Duty Officer determines the level of APS engagement with the incident. The Fire Duty Officer may determine it necessary to provide an on-scene representation (Fire Liaison). The Fire Liaison coordinates efforts with firefighting agencies and keeps firefighter and public safety as a top priority. Identifying electrical hazards and mitigation strategies to reduce impacts and restoration efforts are also part of the Fire Liaison coordination. Depending on the size and complexity of the incident, the Fire Liaison may be coordinating with any of the following Incident Management Team members: Incident Commander, Operations Section Chief or Liaison Officer. Regardless

of the wildland fire incident agency, APS maintains a collaborative approach to achieve the goals of all parties.

14.9.1. Prescribed fire impacts to APS

Publicly managed land agencies are increasing the number of prescribed fires to meet multiple objectives including hazardous fuel reduction, wildlife habitat restoration and watershed restoration. These prescribed fires are often conducted in wildland urban interface areas that include APS infrastructure. It is paramount for APS fire mitigation to work cooperatively with land management agencies to mitigate potential impacts from prescribed fire while working toward a common goal of ecological restoration. APS recognizes the need for prescribed fire treatments and fully supports implementation on the landscape with a collaborative approach.

While outcomes of prescribed fires can be beneficial in terms of reducing future wildfire threat, there are also potential impacts to APS. In terms of immediate and direct impacts during the prescribed fire, there is the potential for smoke impacting APS systems, fire encroaching the Rights-of-Way (ROW) and poles, as well as limited access to equipment due to closure areas. Prolonged, indirect impacts include delayed tree mortality following a prescribed fire creating hazard trees as well as return treatments. Prescribed fire at times requires re-introduction of fire to maintain treatments and often translates to continued impact to APS systems and ROWs.

With the advancement of ecological restoration projects such as the Four Forest Restoration Initiative (4FRI) and Flagstaff Watershed Protection Project (FWPP) in combination with others, prescribed fire frequency and regularity are anticipated to increase in the future, causing an increase in potential impacts. APS fire mitigation is, and will continue working on, building relationships with land management agencies. APS remains an integral shareholder of prescribed fire planning for prescribed fire practitioner safety, to reduce customer impacts and improve resiliency of the electrical grid.

15. Continuous Improvement

An initial review was conducted in 2019 and a follow up review in 2022 by a third party to examine the Comprehensive Fire Mitigation Plan (CFMP) with full access and visibility for review. The audit conducted over 45 interviews, both internal and external, and the results include a critical look at all aspects of the program and plan. Recommendations and corrective actions were taken to improve as well as build on the already solid foundation of the CFMP.

SW ecology, LLC

REPORT: Assessment and Findings of the Arizona Public Service Comprehensive Fire Mitigation Plan and Implementation Strategy

Prepared June 2022

Overview of the Audit:

The CFMP generally acknowledges wildfire as a recurring threat to APS infrastructure, the adjacent ecosystems to system ROW's and the communities and areas served by APS. APS has demonstrated its commitment to protecting its physical assets, employees and customers against the danger of wildfires. It works to identify all potential fire as a manageable risk, through operation and maintenance best practices and implementing effective fire risk mitigation actions. APS also implements best-science and evidence-based decisions to mitigate the possibility of financial costs and potential liability associated with wildland fires.

The CFMP outlines strategies, system modernization priorities, and operational procedures that help employees identify, mitigate, and respond to evolving wildland fire risks. The Plan establishes safety as the first priority and subsequently describes methods of determining situational awareness, Enterprise fire mitigation operational protocols, and response actions specific to wildfire risks.

Summary of the Audit:

The Plan evaluation found that the intent of the Plan is to create a dynamic document for policies, procedures, and metrics that mitigate the fire risk potential, and was found to be effective in meeting the stated objectives. By continuing to update the Plan with current policies, strategies, and procedures, the goal of implementing effective and defendable fire mitigation measures will result in positioning the company to continue its successful trajectory and outcomes into the future.

15.1. Continuous improvement working group

The working group includes individuals from across Transmission, Distribution and Communications (TD&C) to evaluate fire mitigation efforts and create continuous improvement across the company. This working group consists of representatives from various business units, allowing for the ability to combine efforts and objectives to prevent, mitigate and respond to wildfire risk. The overall scope of the fire mitigation working group includes identification of concerns and new projects leading to increased reliability and safety.

15.2. Measures of effectiveness

The APS Comprehensive Fire Mitigation Plan (CFMP) includes measures of effectiveness aimed at gauging the efficiency of policies, programs and mitigations in place. Such effectiveness measures include evaluation criteria, comprising of yearly work plan completion, monitoring of system to ground ignitions, compliance with industrial work plan restrictions, and others. Identifying the appropriate participants, targeting future opportunities and pinpointing the desired outcomes are all part of measuring the program's effectiveness and creating a path forward.

Gauging the level of performance in relation to fire mitigation is key to continuing success moving forward. A year-end review of fire mitigation and reporting at the Fire Mitigation Forum

will incorporate measures of effectiveness. Conveying the results yearly also fosters continuous improvement and identifies program improvement needs and corrective actions.

15.3. International wildfire risk mitigation consortium

The International Wildfire Risk Mitigation Consortium (IWRMC) is an electric utility industry-sponsored collaborative designed to facilitate the sharing of wildfire risk mitigation insights and discovery of innovative and unique wildfire utility practices from across the globe. The organization established a vision to facilitate networking channels between members of the global utility community to support ongoing sharing of data, information, technology, practices, and proactively address the wildfire issue through learning, innovation, analysis, assessment, and collaboration. The mission is to leverage global experiences, ideas and identify meaningful differences to accelerate learning, sharing and the development of new risk models and mitigation strategies. Also, the goals of expediting data collection, validation, evaluation, introducing new technology, and advancing the deployment of innovative solutions enable members to lead the industry transformation.

IWRMC Working Group discussions cover many different topics and focus areas. The six working groups cover a variety of emphasis areas including: Asset Management, Operations and Protocols, Risk Management, Vegetation Management, Data Management, and Stakeholder Engagement. Members routinely share their experiences and help to identify industry leading practices. Occasionally, members invite leading vendors who they have worked with to share more information on the products and services they offer to improve and expedite decision making for those exploring similar options.

Some of the main initiatives and topics of exploration include:

- News and Research Web Portal updated and curated weekly with the latest wildfire/bushfire-related news, academic research, regulations, and mitigation plans from utilities around the world.
- Surveys of industry peers to gather insights into the processes, methodologies, tools, and standards utilized by utilities to support their wildfire risk mitigation activities.
- Deep-dive analyses using public and/or member-contributed data and supported by UMS Group’s expert analytic and modeling teams.
- Case studies to communicate relevant experiences and provide lessons learned to the broader industry.
- Joint development projects created to pool resources, coordinate data collection and document real-world results in the pursuit of new ideas, approaches and innovations.
- New technology and tools to explore the vendor landscape, broaden the dataset of real-world experiences and utilize collective leverage to deploy new tools and technologies quickly and affordably.

- Benchmarking, analysis and performance metrics are considered to better understand the APS organization performance relative to the industry, or track progress over time to build best management practices and reduce the risk and impact of wildfire.

16. Past three-year impacts from wildfire

Arizona has experienced an increase in the amount of wildfire activity across the state over the last several decades. In the last three years, APS has experienced increased exposure to wildfires across its service territory. Impacts from wildfire have included outages to distribution circuits, transmission lines and range from momentary to extended in duration. The average number of fires across the state for the last three decades is 2,694, burning 253,865 acres on average. For the last three years, the averages have represented an increase to 573,621 acres burned with the number of fires remaining steady around 1,765 per year.

While the number of fires has remained steady, the size of wildland fires has increased substantially. APS has responded to an increase in fire activity by activating Transmission, Distribution, and Communications Incident Command Center (TDCICC) early and engaging throughout the duration of the incident. With early activation of TDCICC, APS has created an effective response to wildfires and restoration following an event.

17. Planned Implementations for 2024 to Mitigate Risk

Mitigating risk can result in outages to our customers and we realize any interruption of power is an inconvenience. APS continues to innovate our risk mitigation efforts to create a better experience for our customers. In 2024, APS will continue to invest in technology to reduce the risk while providing for customer experience. In addition, improving our system hardening to make the grid more resilient to wildfire and therefore reducing risk and impact overall. Situational awareness will remain an emphasis throughout 2024 with an increased integration of fire mitigation efforts throughout APS and extending to stakeholders.

18. Plan summary

The APS Comprehensive Fire Mitigation Plan (CFMP) does not describe all ongoing operations and maintenance APS performs and will continue to perform to reduce wildfire risk in Arizona. APS is constantly improving its plan in vegetation management, inspections and system hardening, situational awareness, operational practices, public awareness to wildfire, and industry research.

The APS CFMP is a living document that is continuously reviewed, evaluated and modified as needed. Plan drivers such as fire mitigation initiatives and strategies are assessed regularly to allow for the continuous evaluation of wildfire risk reduction programs. Fire Mitigation will monitor and evaluate both the performance of the strategies and programs described in this plan and the plan’s efficacy in addressing wildfire risk.

Ongoing trend analyses of fire risk indices are collected and analyzed to adapt to changes in the Arizona ecosystem. APS recognizes when dealing with natural systems (wildfire ecosystem), it

is impossible to predict all indices with certainty but anticipates with the investments in the program, trends will reduce risk.

As mentioned in the executive summary, reducing risk to our human and environmental communities is paramount. Wildland fuel mitigation needs to be emphasized to all stakeholders as we work together to address the risk of catastrophic wildfire. We cannot make significant strides in reducing catastrophic wildland fire risk unless all stakeholders participate in creating defensible space. APS has identified the risk and is working with its partners to create a cohesive strategy for fire mitigation.

19. Glossary of terms and acronyms

CFMP: Comprehensive Fire Mitigation Plan

ConvergePoint: APS central repository for enterprise policies, processes, and procedures

CPR: [Wildland] "Call, Plan, and Respond," "Call, Plan, Respond", the APS approved method for responding to wildfires.

DOC: Distribution Operations Center

DOE: Distribution Operations Engineering

ECC: Energy Control Center

Elevated Fire Conditions: the period when Preparedness Level is 3 or above

EMS: Energy Management System

Emergent Work: Work that shall be completed because of an operational situation that currently poses a threat to the safety and reliability of the grid.

Fire Guard: A Fire Guard shall consist of 3 hours of continual watch. A Fire Guard can be provided by any APS employee, or contractor that has the proper fire tools and the ability to act if necessary.

Fire Guard Patrol: Patrol to be safely performed ASAP after re-energization of a circuit, or sectionalized portion of a circuit, to check for possible ignitions due to re-energization.

Fire Risk Index: A risk index given to a line or distribution feeder by the FMS measured by three major fire components (probability of ignition, probability of a fire will carry, and fire impact as risk). Indices range from 1-5 in 0.5 increments, (5) being the highest risk.

FM: Fire Mitigation

FMS: Fire Mitigation Specialist

Ground to System Fire: An ignition source/fire unrelated to APS owned equipment, which has an impact to APS.

High Fire Risk Circuits: those circuits that have been determined to be high risk for fire based on historical fire activity, and on assigned Fire Risk Index. Additional operational measures are applied to these circuits for Elevated Fire Conditions.

Impractical: referring to a line patrol when conditions such as weather, terrain, or time of day prevent a line patrol from occurring due to safety concerns.

NIFC: National Interagency Fire Center – The National logistical support center.

Non-Emergent Work: Planned work that is not critical to operations and reliability of the grid in the short term.

Pre-Emergent Work: Work that shall be completed because of an operational situation that poses a threat to the safety and reliability of the grid in the immediate future.

Preparedness Level: Wildfire preparedness level from 1 – 5 with 1 being the lowest/least severe and 5 being the highest/most severe. Each Preparedness Level has specific work restrictions that must be adhered to by T&D personnel.

Shall: Denotes a requirement. Compliance with this step or item is mandatory.

Should: Denotes a recommendation. Compliance with this step or item is optional but recommended by management.

SOCS: System Outage Communication Specialists

System to Ground Fire: Any ignition source related to APS equipment or related system operations

SWCC: Southwest Coordination Center – provides logistical support for wildland fire, prescribed fire, and other all-risk incidents between the twelve Federal and State Dispatch Centers of the Southwest area. In addition, the Center provides Predictive Services and Intelligence related products.

TDCICC: Transmission, Distribution, and Communications Incident Command Center

WUI (Wildland Urban Interface): The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

20. APS references and document locations

1. TD–M0–PRD–D010 Elevated Fire Conditions, *APS ConvergePoint*
2. TD–M0–PRD–E010 Comprehensive Fire Mitigation Plan, *APS ConvergePoint*
3. TD-DO-PRD-A035 Operations Preparation & Response to Elevated Fire Conditions, *APS ConvergePoint*
4. Accident Prevention Manual and Safe Working Rules, *Corporate Safety & Health SharePoint*
5. Distribution Operations Supporting Information, *Distribution Operations SharePoint*
6. Vegetation Management Manual, *Forestry, Fire & Resource Management SharePoint*
7. TD-DO-PRD-A001 Transmission and Distribution Electric Load Curtailment Plan, *APS ConvergePoint*
8. TD-PE-PRD-1005 Fire Extinguisher Procedure, *APS ConvergePoint*
9. Forestry, Fire & Resource Management Business Continuity Plan (BCP), *ConvergePoint*
10. Right Tree Right Place, *Forestry, Fire & Resource Management SharePoint*
11. Western Region Mutual Assistance Agreement, *APS Emergency Management*
12. Standard Operating Guidelines – Fire Mitigation Specialist, *Fire Mitigation SharePoint*
13. Fire Mitigation P Level & CPR Card, *Fire Mitigation SharePoint*
14. T&D Emergency Operations Plan (EOP), *T&D Emergency Management SharePoint*

21. External references

Ballard L, Boness K, Bright D, Brill K, Buettner G, Cassady S, Castillo K, Dahlberg H, Dawe C, Eiden A, et al. 2010. Arizona Forest Resource Assessment. [Internet]. [cited 2020 Dec 16]. Phoenix (AZ): Arizona State Forestry. Available from https://dffm.az.gov/sites/default/files/media/Arizona%20Forest%20Resource%20Assessment-2010_0.pdf

Martinuzzi, Sebastiín; Stewart, Susan I.; Helmers, David P.; Mockrin, Miranda H.; Hammer, Roger B.; Radeloff, Volker C. 2015. The 2010 wildland-urban interface of the conterminous United States. Research Map NRS-8. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 124 p. [includes pull-out map]. https://www.nrs.fs.fed.us/pubs/48642.

O'Brien, Renee A. 2002. Arizona's Forest Resources, 1999. Resource. Bull. RMRS-RB-2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 116 p.

Southwest Interagency Fire Restrictions and Closure Master Operating Plan 2019. c2020. Southwest Coordination Center. [cited 2020 Dec 16]. Available from: https://gacc.nifc.gov/swcc/management_admin/Agency_Administrator/Agency_Administrator.htm

USDA. 2020, "Forest Insect and Disease Conditions in the Southwestern Region, 2019." Available at: https://www.fs.usda.gov/main/r3/forest-grasslandhealth

World Population Review. c2020. World Population Review. [cited 2020 Dec 16]. Available from: https://worldpopulationreview.com/states/arizona-population.

Publicly Managed Lands Fire Dispatch Center Contact Numbers:

As stated previously in the CFMP, APS crews and contract crews shall provide some form of prompt and reliable direct communication, such as a cell phone or portable radio, between the Fire Guard(s) and the work crews, and between the contractor's operations and APS Supervisor. In the event of an emergency, activate the emergency system by calling 911 and the APS Project lead. In addition, a list of the Publicly Managed Land Dispatch numbers is provided below. Please ensure the APS Wildfire CPR is reviewed each day or if a job location changes throughout the day.

Check-in-Check-Out: All crews working in exemption and restricted areas are required to check in and check out with APS project lead each workday and provide GPS location each morning prior to starting work. This requirement would be determined during the Work Approval Review Meeting (WARM) with APS Leadership.

Interagency Dispatch	**Phone Number**
Arizona: Arizona State Lands	623-582-0911
Flagstaff: Coconino NF, NE AZ	928-527-3552
Phoenix: Tonto NF, Payson, Globe, Mesa	480-457-1555
Prescott: Prescott NF, BLM West & Central AZ	928-777-5700
Springerville: Apache-Sitgreaves NF, NE-Central AZ	928-333-6360
Tucson: Coronado NF, BLM SE AZ	520-202-2710
Williams: Kaibab NF, Tusayan, Grand Canyon	928-635-2601

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